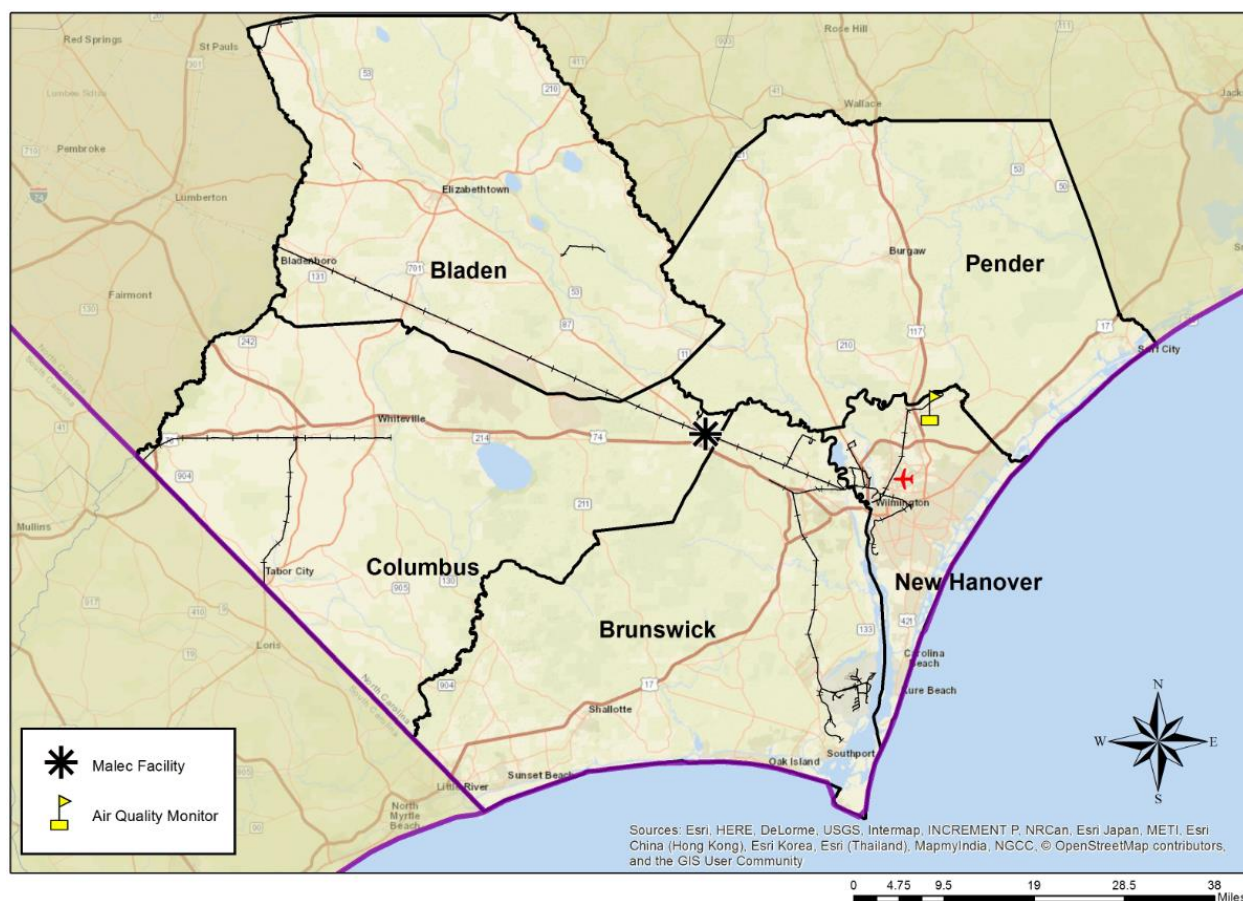


# State of Air Quality Surrounding the Malec Brothers Transport Facility

Facility ID: 2400165

Permit #: 10560R00



North Carolina Department of Environmental Quality  
Division of Air Quality  
Planning Section

July 16, 2018

## **PREFACE**

This document contains the Division of Air Quality's (DAQ) review of the state of air quality, the sources of air pollution, and other relevant information surrounding the Malec Brothers Transport Facility in eastern Columbus County. This new facility would increase methyl bromide emissions to the ambient (outdoor) air. Methyl bromide is a type of volatile organic compound that is also a hazardous air pollutant and a greenhouse gas. We are providing this information to help the reader better understand the type and quantity of air emissions releases, the overall state of air quality and other demographic and environmental statistics as reported or compiled by the DAQ, the U.S. Environmental Protection Agency, and other local, state and federal groups. For the purpose of presenting these data, the area of interest is defined as Bladen, Brunswick, Columbus, New Hanover, and Pender Counties in North Carolina.

## Table of Contents

1	Air Quality Monitoring Data .....	1
1.1	Satellite Imagery Data.....	4
2	Air Emissions Source Categorization .....	6
2.1	Methyl Bromide Emissions.....	8
2.2	Volatile Organic Compounds (VOC) Emissions .....	9
2.3	Federal Hazardous Air Pollutants (HAPs) .....	10
2.4	State Toxic Air Pollutants .....	16
2.5	North Carolina Power Plant Emissions Data .....	19
2.6	Prescribed Fires and Wildfire Events.....	22
2.7	Greenhouse Gas Emissions .....	25
3	Wind Rose.....	28
4	Demographic and Socioeconomic Data.....	30
4.1	CDC Statistics for Columbus County .....	31
4.2	CDC Statistics for Brunswick County .....	33
4.3	CDC Statistics for Bladen County .....	35
4.4	CDC Statistics for Pender County.....	37
4.5	CDC Statistics for New Hanover County .....	39
5	National Air Toxics Assessment (NATA).....	41
5.1	National Air Toxics Assessment (NATA) for Bladen, Brunswick, Columbus, New Hanover and Pender Counties (Source: EPA Draft).....	43

## Table of Figures

Figure 2.1 Area of Interest – Methyl Bromide Emitting Facilities .....	8
Figure 2.2 Area of Interest – VOC Emitting Facilities .....	9
Figure 2.3 Statewide Toxic Pollutant Totals Trend (1993-2016) .....	16
Figure 2.4 Area of Interest Counties Toxic Pollutant Totals Trend (1993-2016) .....	17
Figure 2.5 CPI USA Southport Plant Facility Level 2014 Daily SO <sub>2</sub> Emissions (tons) .....	20
Figure 2.6 CPI USA Southport Plant Facility Level 2014 Daily NO <sub>x</sub> Emissions (tons) .....	20
Figure 2.7 L V Sutton Plant Facility Level 2014 Daily SO <sub>2</sub> Emissions (tons) .....	21
Figure 2.8 L V Sutton Plant Facility Level 2014 Daily NO <sub>x</sub> Emissions (tons) .....	21
Figure 2.9 L V Sutton Plant Facility Level 2014 Daily CO <sub>2</sub> Emissions (short tons) .....	21
Figure 2.10 Area of Interest - 2014 Prescribed Fire Locations .....	23
Figure 2.11 Area of Interest - 2014 Wildfire Locations .....	24
Figure 3.1 Wind Rose for New Hanover County Airport .....	29
Figure 5.1 Bladen County Cancer Risk, 2014NATA* .....	43
Figure 5.2 Brunswick County Cancer Risk, 2014NATA* .....	43
Figure 5.3 Columbus County Cancer Risk, 2014NATA* .....	44
Figure 5.4 New Hanover County Cancer Risk, 2014NATA* .....	44
Figure 5.5 Pender County Cancer Risk, 2014NATA* .....	45

## **Table of Tables**

Table 1.1 Current National Ambient Air Quality Standards and Designations.....	2
Table 1.2 Ozone and PM <sub>2.5</sub> Design Values for Castle Hayne Monitor, New Hanover County, North Carolina .....	3
Table 2.1 2014 NEIv2 Methyl Bromide Emissions (tons) .....	8
Table 2.2 2014 NEIv2 VOC Emissions (tons).....	9
Table 2.3 2014 NEIv2 Total HAP Emissions (tons).....	10
Table 2.4 HAP Emissions from Air Permitted Sources.....	11
Table 2.5 Toxic Air Pollutants Summary .....	18
Table 2.6 Number and Acres Burned for 2014 Prescribed Fires .....	23
Table 2.7 Number and Acres Burned for 2014 Wildfires .....	24
Table 2.8 Proposed Malec Brothers Transport, LLC Plant .....	25
Table 2.9 2014 Total GHG Emissions by County (tons CO <sub>2</sub> e) .....	27
Table 2.10 2014 Total GHG Emissions in the Area of Interest (tons CO <sub>2</sub> e).....	27
Table 5.1 Air Toxic Pollutants Included in NATA.....	45
Table 5.2 Pollutants Excluded from NATA .....	50

# 1 Air Quality Monitoring Data

"Ambient air" is the outside air that we all breathe. This term is specifically defined by the U.S. Environmental Protection Agency (EPA) as "that portion of the atmosphere, external to buildings, to which the public has access."

In the early 1970s, EPA listed six major air pollutants that affected the quality of ambient air and established concentration limits for these pollutants. These limits are known as the National Ambient Air Quality Standards (NAAQS). Primary limits or standards were established to protect human health and secondary standards were established to protect human welfare and the quality of life. Through the years, the NAAQS have been revised and amended to account for evolving scientific understanding of air pollution and its impacts. Currently, the six criteria pollutants are:

- Ozone (O<sub>3</sub>)
- Particulate Matter (PM<sub>2.5</sub> and PM<sub>10</sub>)
- Carbon Monoxide (CO)
- Sulfur Dioxide (SO<sub>2</sub>)
- Nitrogen Dioxide (NO<sub>2</sub>)
- Lead (Pb)

These six pollutants can cause serious human health problems (including premature mortality) and damage the environment and property. Common sources of these pollutants are coal-fired power plants, industrial manufacturing sources, and on-road and off-road vehicles. In Table 1.1, we have listed the current NAAQS for each of the six criteria pollutants and their attainment designation status in Bladen, Brunswick, Columbus, New Hanover and Pender counties.

Table 1.2 contains design value data, a statistic that describes the air quality status of a given location relative to the level of the NAAQS for both ozone and PM<sub>2.5</sub> as recorded by the Castle Hayne Monitor, located in New Hanover County, NC. This monitor is selected based on its close proximity to the study area: Bladen, Brunswick, Columbus, New Hanover and Pender counties (Castle Hayne Monitor, located in New Hanover County, NC) for both ozone and PM<sub>2.5</sub>.

**Table 1.1 Current National Ambient Air Quality Standards and Designations**

Pollutant	Standard*	Form of Standard	Designations**				
			Bladen County	Brunswick County	Columbus County	New Hanover County	Pender County
2008 8-Hour Ozone	75 ppb	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 consecutive years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2015 8-Hour Ozone	70 ppb	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 consecutive years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2011 1-Hour CO	35 ppm	Not to be exceeded more than once per year	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2011 8-Hour CO	9 ppm	Not to be exceeded more than once per year	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2008 Rolling 3-Month Average Lead	0.15 µg/m <sup>3</sup>	Not to be exceeded	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2010 1-Hour NO <sub>2</sub>	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 consecutive years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2012 24-hour PM <sub>2.5</sub>	35 µg/m <sup>3</sup>	98th percentile, averaged over 3 years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2012 Annual PM <sub>2.5</sub>	12 µg/m <sup>3</sup>	Annual mean, averaged over 3 years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2012 24-Hour PM <sub>10</sub>	150 µg/m <sup>3</sup>	Not to be exceeded more than once per year on average over 3 years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
2010 1-Hour SO <sub>2</sub>	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment

\* ppm = parts per million, ppb = parts per billion, µg/m<sup>3</sup> = micrograms per cubic meter.

\*\* Unclassifiable/Attainment means that an area monitor is meeting the NAAQS or – in the absence of a monitor, no reason to believe that the area is violating the NAAQS or contributing to a NAAQS violation elsewhere.

**Table 1.2 Ozone and PM<sub>2.5</sub> Design Values for Castle Hayne Monitor, New Hanover County, North Carolina**

Pollutant	Design Value										
	Current NAAQS	06-08	07-09	08-10	09-11	10-12	11-13	12-14	13-15	14-16	15-17
Ozone 8-Hour Average (ppb)*	<u>70</u>	69	65	62	62	63	64	63	61	60	58
PM <sub>2.5</sub> 24-Hour Average (µg/m <sup>3</sup> )*	<u>35</u>	N/A**	N/A**	N/A**	N/A**	23	21	15	14	14	14
PM <sub>2.5</sub> Annual Average (µg/m <sup>3</sup> )	<u>12</u>	N/A**	N/A**	N/A**	N/A**	7.7	7.2	6.6	6.4	6.4	6.2

\* ppb = parts per billion, µg/m<sup>3</sup> = micrograms per cubic meter.

\*\* Data completeness issues in 2008 and 2009 prevented an annual or daily PM<sub>2.5</sub> design value from being computed for any year in which 2008 or 2009 was a part of the calculation.



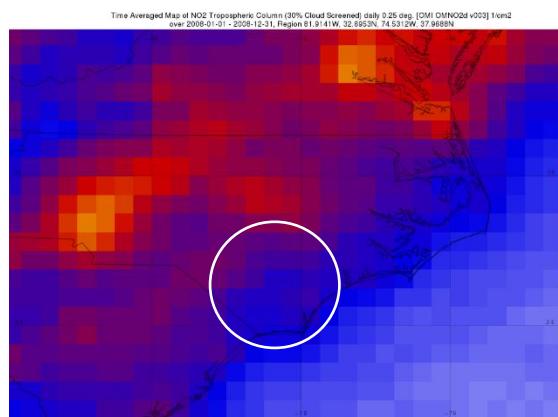
## 1.1 Satellite Imagery Data

There is more than one way to gather data on air pollution. The most accurate and reliable way is by using surface monitors to specifically measure a given pollutant (see Table 1.2). In addition, satellite-derived pollutant data is a great approximation of inter-year pollution trends, especially for areas where monitoring data is sparse.

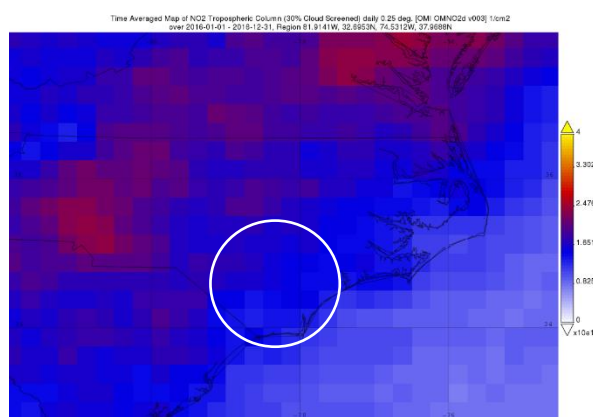
Satellites measure air pollution by averaging the depth of a given pollutant within a column of air that comprises the entire troposphere, or bottom layer of the atmosphere. The following images show satellite-derived pollutant concentrations for NO<sub>2</sub>, SO<sub>2</sub>, CO, and Aerosol Optical Depth (AOD) spanning the Carolinas for 2008 and 2016.<sup>1</sup> A circle on each image identifies the area of the proposed location for the Malec Brothers Transport Facility. For each of the four pollutants, the image on the left represents the average of daily satellite readings across the entire calendar year of 2008, while the image on the right represents the same for the calendar year of 2016. All of the images come from satellites operated by National Aeronautics and Space Administration (NASA), and the data is freely available at the link: <https://giovanni.gsfc.nasa.gov/giovanni/>. Units of measurement vary by pollutant, but the scale for each pollutant has been kept the same for the 2008 and 2016 images to show the satellite-derived evolution of the given pollutant over recent years. Warmer colors represent higher pollutant concentrations, while cooler colors represent lower pollutant concentrations.

As the following maps show, pollutant concentrations have decreased across the board between 2008 and 2016, both in the immediate area of the Malec Brothers Transport facility and across the rest of the Carolinas. The satellite data is consistent with surface monitor readings over the Carolinas, which also show significant decreases during this time.

NO<sub>2</sub>, 2008

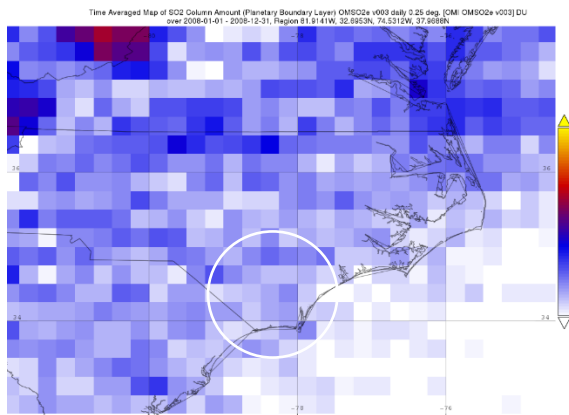


NO<sub>2</sub>, 2016

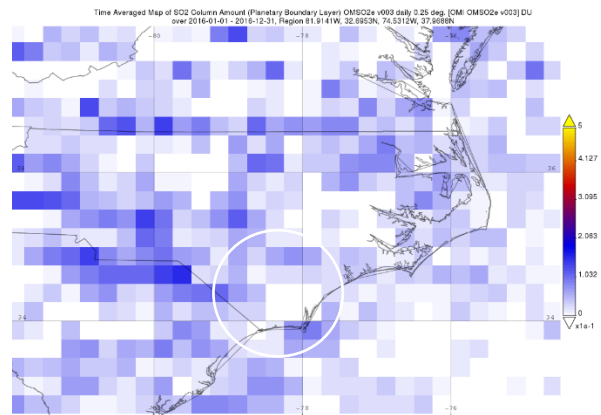


<sup>1</sup> Aerosol Optical Depth (AOD) is a collection of a number of particle pollutants, and serves as a general indicator of overall particle pollution.

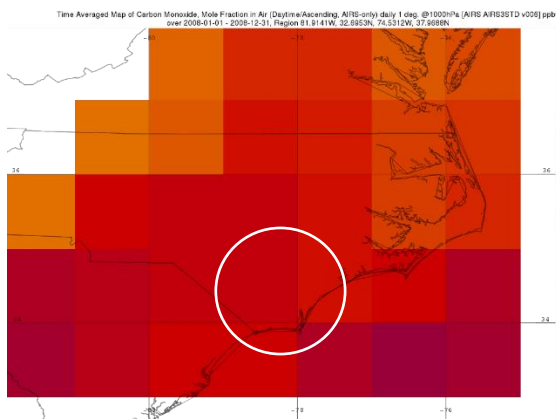
SO<sub>2</sub>, 2008



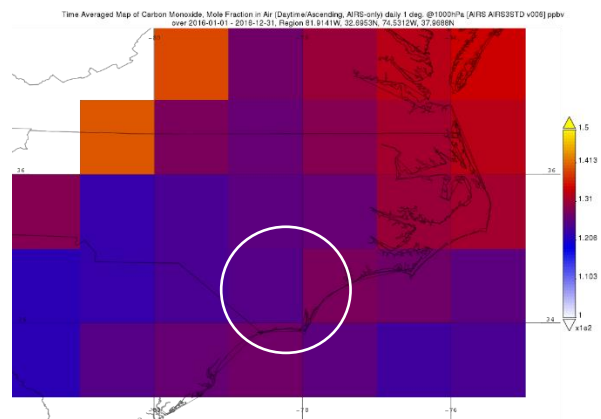
SO<sub>2</sub>, 2016



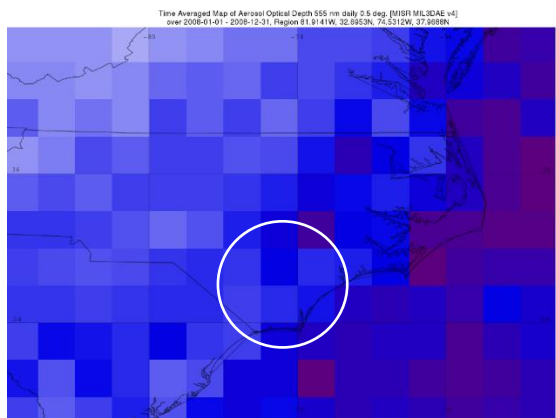
CO, 2008



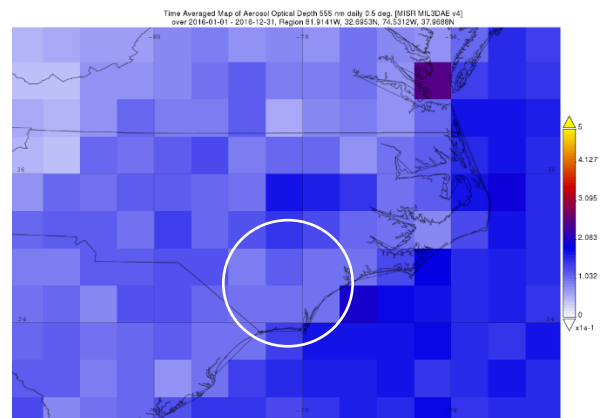
CO, 2016



AOD, 2008



AOD, 2016



## 2 Air Emissions Source Categorization

This section displays maps showing sources of air pollution reported by permitted facilities in the area of interest over southeastern North Carolina. This area of interest includes all of Bladen, Brunswick, Columbus, New Hanover, and Pender counties.

The section also shows estimates of methyl bromide, volatile organic compounds (VOC), hazardous air pollutant (HAP), state toxic air pollutant (TAP), and greenhouse gas (GHG) emissions for the area of interest as well as expected emissions from the proposed Malec Brothers Transport facility. Note the new Malec Brothers Transport facility will increase VOC emissions because methyl bromide is a type of VOC; however, the facility will not increase emissions of other criteria air pollutants or their precursors. Therefore, this section focuses on VOC only with respect to criteria air pollutant precursor emissions.

The facility's reported emissions data are the expected emissions contained in the facility's Title V permit application.<sup>2</sup> Although the specific source of the emissions data for each pollutant is identified in the individual pollutant sections, the most common source is Version 2 of EPA's 2014 National Emissions Inventory (2014 NEIv2).<sup>3</sup> Each pollutant is broken down by sector and county (or portion of county). The individual sectors are defined below.

**Electricity Generating Unit (EGU)** – permitted, stationary combustion sources such as boilers and turbines that generate electricity for sale on the power grid.

**Non-EGU Point** – permitted, stationary industrial, commercial, and institutional facilities.

**Nonpoint** – stationary sources that individually are too small in magnitude/too numerous to inventory as individual point sources.

**Fires** – includes both prescribed burning and wildfires.

**Onroad** – all motor vehicles that are licensed to use public roads. Onroad vehicles include passenger cars, motorcycles, and various classes of trucks and buses categorized according to vehicle weight and drive cycle characteristics.

**Nonroad** – mobile vehicles and equipment that are not licensed to use public roads, which includes aircraft, commercial and recreational marine vessels, locomotives, and lawn and garden, construction, and recreational equipment as well as many other types of equipment.

**Biogenics** – natural sources, such as vegetation (plants and trees) and microbial activity in soils.

---

<sup>2</sup> Proposed Application Review for Malec Brothers Transport, LLC, North Carolina Division of Air Quality, accessed via IBEAM on April 3, 2018.

<sup>3</sup> United States Environmental Protection Agency, "Air Emissions Inventories, 2014 NEI Data," available from <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>, accessed April 2018.

Methyl bromide is a Class I ozone depleting substance as defined by the Montreal Protocol<sup>4</sup>. Under the decree that was negotiated by many countries in Montreal, Canada, all methyl bromide emissions globally were phased out by 2015, with narrow exemptions allowed for “critical use<sup>5</sup>.” One such exemption of methyl bromide use is for the fumigation of shipping containers to prevent the introduction of pests during the importing or exporting of goods. The Malec Brothers Transport facility will export Southern Yellow Pine logs internationally, and fumigation of the logs in their shipping containers is a requirement before exporting. Thus, the use of methyl bromide as a fumigant is allowable under the Montreal Protocol.

For the non-EGU point sector, one facility accounts for nearly all of the methyl bromide emissions in New Hanover county (see Table 2.1). This facility asked for and accepted a change in its permit -- from a Title V permit to a synthetic minor permit – after 2014, which required a reduction in methyl bromide emissions to less than 10 tons per year. Observed methyl bromide emissions from this facility then dropped from approximately 36 tons per year in 2014 to less than 10 tons per year from 2015 through 2017. The revision to the facility’s operating permit was completed in January 2017.

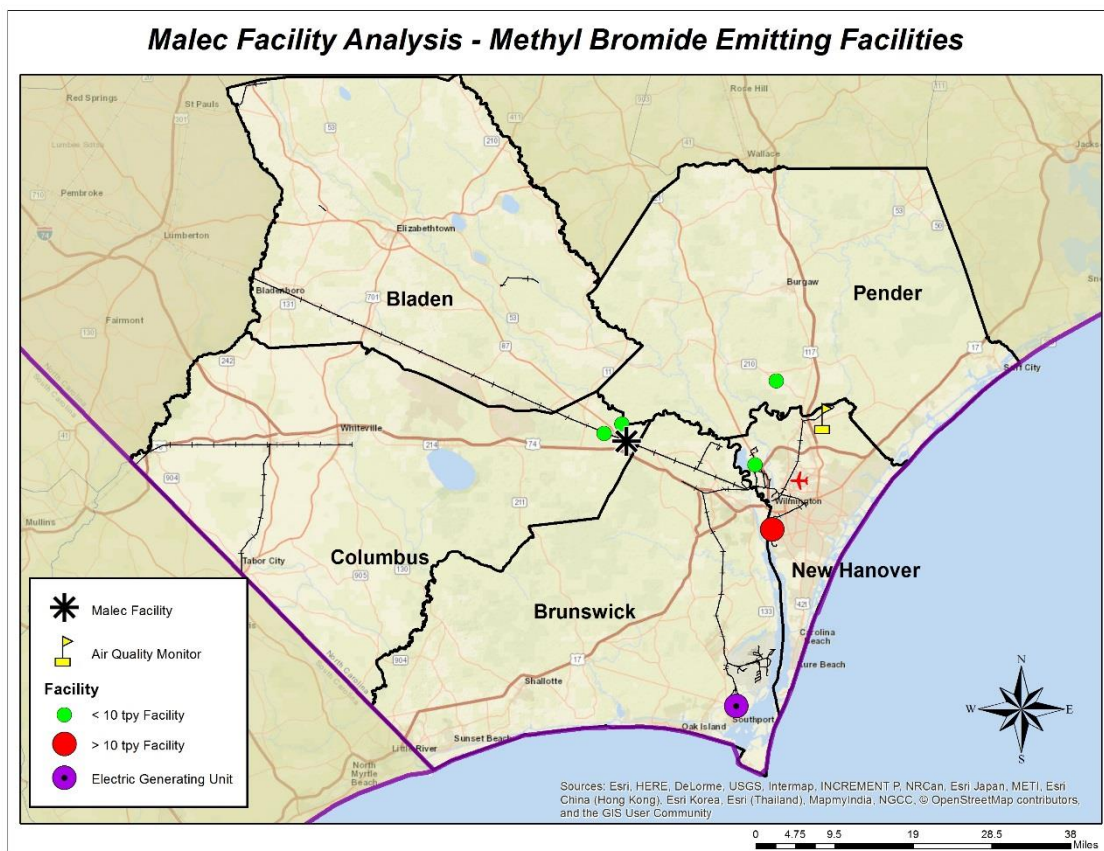
Because methyl bromide is a Volatile Organic Compound (VOC) and is also classified as a Hazardous Air Pollutant (HAP), Tables 2.2 – 2.4 show the emissions of VOCs and HAPs across the area of interest.

---

<sup>4</sup> United States Environmental Protection Agency, “Methyl Bromide,” available from <https://www.epa.gov/ods-phaseout/methyl-bromide>, accessed April 2018.

<sup>5</sup> Ozone Secretariat, “Summary of control measures under the Montreal Protocol,” available from <http://ozone.unep.org/en/handbook-montreal-protocol-substances-deplete-ozone-layer/54>, accessed April 2018.

## 2.1 Methyl Bromide Emissions



**Figure 2.1 Area of Interest – Methyl Bromide Emitting Facilities**

**Table 2.1 2014 NEIv2 Methyl Bromide Emissions (tons)**

Sector	Counties of Interest					Total Area of Interest
	Bladen	Brunswick	Columbus	New Hanover	Pender	
EGU		0.05				0.05
Non-EGU Point			0.25	36.09*	4.52**	40.86
Nonpoint						0
Fires						0
Onroad						0
Nonroad						0
Biogenics						0
<b>Total</b>	<b>0</b>	<b>0.05</b>	<b>0.25</b>	<b>36.09</b>	<b>4.52</b>	<b>40.91</b>
Malec Brothers			140***			140
<b>Total with Malec Brothers</b>			<b>140.25</b>			<b>180.91</b>

Source of Data: EPA 2014 NEIv2

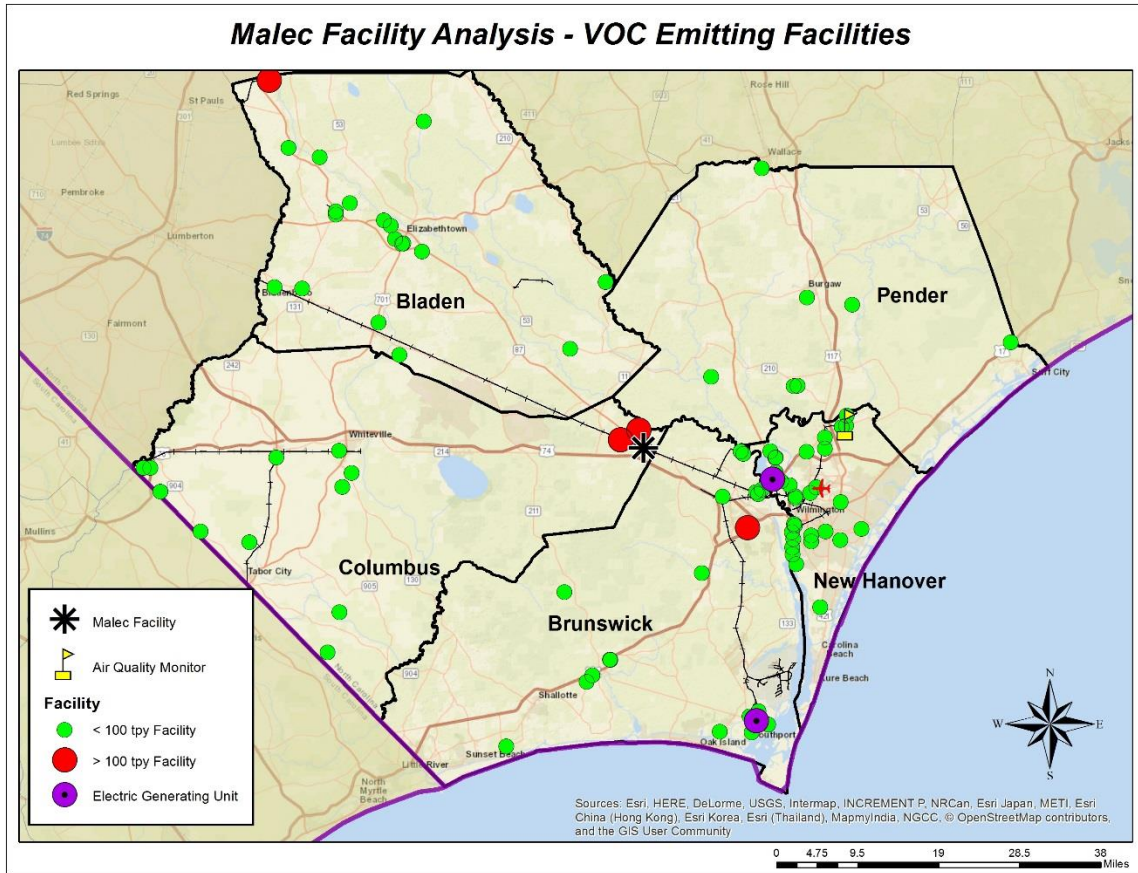
\* 2014 emissions value for Royal Pest facility is reported here. This facility will emit less than 10 tons per year after 2015, per its updated permit.

\*\* Pender County methyl bromide emissions have been updated with the 2014 emissions reported to NC's IBEAM database; this updated value was reported to EPA but was not included in the 2014 NEIv2.

\*\*\* Emissions value is from the Malec Brothers Title V permit application.



## 2.2 Volatile Organic Compounds (VOC) Emissions



**Figure 2.2 Area of Interest – VOC Emitting Facilities**

**Table 2.2 2014 NEIv2 VOC Emissions (tons)**

Sector	Counties of Interest					Total Area of Interest
	Bladen	Brunswick	Columbus	New Hanover	Pender	
EGU		10		6		16
Non-EGU Point	348	227	3,066	300	14	3,955
Nonpoint	1,451	1,184	1,151	2,082	946	6,814
Fires	292	530	77	39	1,146	2,084
Onroad	364	999	675	1,453	633	4,124
Nonroad	237	753	379	792	197	2,358
Biogenics	23,695	24,361	25,022	7,179	23,748	104,005
<b>Total</b>	<b>26,387</b>	<b>28,064</b>	<b>30,370</b>	<b>11,851</b>	<b>26,684</b>	<b>123,356</b>
Malec Brothers			140			140
<b>Total with Malec Brothers</b>			<b>30,510</b>			<b>123,496</b>

Source of Data: EPA 2014 NEIv2

## 2.3 Federal Hazardous Air Pollutants (HAPs)

**Table 2.3 2014 NEIv2 Total HAP Emissions (tons)**

Sector	Counties of Interest					Total Area of Interest
	Bladen	Brunswick	Columbus	New Hanover	Pender	
EGU		72		2		74
Non-EGU Point	56	16	1,507	161	12	1,752
Nonpoint	100	143	108	262	89	702
Fires	53	73	19	4	235	384
Onroad	100	273	185	397	172	1,127
Nonroad	77	229	125	249	59	739
Biogenics	2,565	2,509	2,542	710	2,432	10,758
<b>Total</b>	<b>2,951</b>	<b>3,315</b>	<b>4,486</b>	<b>1,785</b>	<b>2,999</b>	<b>15,536</b>
Malec Brothers			140			140
<b>Total with Malec Brothers</b>			<b>4,626</b>			<b>15,676</b>

Source of Data: EPA 2014 NEIv2

**Table 2.4 HAP Emissions from Air Permitted Sources**

Chemical Abstracts Service (CAS) No.	Pollutant Name	Counties in Area of Interest						Malec Brothers Potential emissions (lbs/yr)
		Bladen (lbs/yr)	Brunswick (lbs/yr)	Columbus (lbs/yr)	New Hanover (lbs/yr)	Pender (lbs/yr)	Total (lbs/yr)	
100-02-7	Nitrophenol, 4-		0.52	0.35			0.87	
100-41-4	Ethyl benzene	1,602.98	1,626.23	1,462.95	1,487.04		6,179.21	
100-42-5	Styrene	1,009.45	9,258.35	5,114.77	0.93	6,238.90	21,622.41	
100-44-7	Benzyl chloride		120.00				120.00	
106-42-3	Xylene, p-		1,287.35	3,339.81	13,655.17		18,282.33	
106-46-7	Dichlorobenzene(p), 1,4-	0.79	0.01	799.39	17,397.89		18,198.08	
106-51-4	Quinone		3.88		27.52		31.41	
106-93-4	Ethylene Dibromide		0.20		13.79		13.99	
106-99-0	Butadiene, 1,3-		27.4256	25.3573	3.2837		56.07	
107-02-8	Acrolein	1.03	19,690.20	8,007.65	23.12		27,722.00	
107-06-2	Ethylene dichloride (1,2-dichloroethane)	541.00	147.96	113.69	18.95		821.60	
107-13-1	Acrylonitrile		85.20	6.41	3.05		94.66	
107-21-1	Ethylene glycol	134.00	756.35		379.66		1,270.01	
108-05-4	Vinyl acetate		1.30	4.83			6.13	
108-10-1	MIBK (methyl isobutyl ketone)	48.61	2,822.99	4,769.76	1,437.06		9,078.42	
108-38-3	Xylene, m-			3,331.99	0.00020		3,331.99	
108-88-3	Toluene	5,770.32	9,437.21	2,924.15	6,134.01		24,265.70	
108-90-7	Chlorobenzene		160.92	287.39	40.77		489.08	
108-95-2	Phenol		456.77	44,837.83	5,157.53		50,452.13	
110-54-3	Hexane, n-	2,648.97	527.64	8,612.82	3,550.87		15,340.30	
117-81-7	DEHP (Di(2-ethylhexyl)phthalate)		16.32	0.17			16.49	
118-74-1	Hexachlorobenzene			3.66			3.66	
120-82-1	Trichlorobenzene, 1,2,4-			5,163.76			5,163.76	



Chemical Abstracts Service (CAS) No.	Pollutant Name	Counties in Area of Interest						Malec Brothers Potential emissions (lbs/yr)
		Bladen (lbs/yr)	Brunswick (lbs/yr)	Columbus (lbs/yr)	New Hanover (lbs/yr)	Pender (lbs/yr)	Total (lbs/yr)	
121-14-2	Dinitrotoluene, 2,4-		0.05	3.37			3.42	
121-44-8	Triethylamine			1.72			1.72	
123-38-6	Propionaldehyde		357.78	20,039.39	551.43		20,948.60	
123-91-1	Dioxane, 1,4-		815.53		854.10		1,669.63	
127-18-4	Perchloroethylene (tetrachloroethylene)	1.49	181.05	1,978.79	315.67		2,477.00	
1319-77-3	Cresol (mixed isomers)			97,732.61			97,732.61	
132-64-9	Furans - Dibenzofurans		0.62	0.0008			0.62	
1330-20-7	Xylene (mixed isomers)	3,446.77	7,331.25	6,588.47	4,267.44		21,633.93	
1336-36-3	PCB (polychlorinated biphenyls)		0.04	0.03			0.07	
1634-04-4	Methyl tertiary butyl ether (MTBE)		5.90				5.90	
463-58-1	Carbonyl sulfide		248.80	3,407.19	17.54		3,673.53	
50-00-0	Formaldehyde	78.52	21,953.54	33,288.64	4,983.63		60,304.33	
50-32-8	Benzo(a)pyrene	0.00199	12.39	11.14	0.0042		23.53	
51-28-5	Dinitrophenol, 2,4-		0.97	0.50			1.47	
532-27-4	Chloroacetophenone, 2-		1.20				1.20	
534-52-1	Dinitro-o-cresol, 4,6- (& salts)			6.02			6.02	
540-84-1	Trimethylpentane, 2,2,4-		1.36	218.11	172.68		392.15	
542-75-6	Dichloropropene, 1,3-				88.16		88.16	
56-23-5	Carbon tetrachloride		220.69	873.97	1.72		1,096.38	
60-34-4	Methyl hydrazine		29.00				29.00	
62-53-3	Aniline		53.20	20.15			73.35	
67-56-1	Methanol (methyl alcohol)	40,217.33	6,992.54	2,361,283.87	36,486.84		2,444,980.59	
67-66-3	Chloroform	1.00	143.80	9,977.26	4.00		10,126.06	

Chemical Abstracts Service (CAS) No.	Pollutant Name	Counties in Area of Interest						Malec Brothers Potential emissions (lbs/yr)
		Bladen (lbs/yr)	Brunswick (lbs/yr)	Columbus (lbs/yr)	New Hanover (lbs/yr)	Pender (lbs/yr)	Total (lbs/yr)	
67-72-1	Hexachloroethane			11.35			11.35	
71-43-2	Benzene	12.40	20,723.57	6,109.65	2,076.70		28,922.33	
71-55-6	Methyl chloroform	0.01	148.86	309.77	36.38		495.02	
74-83-9	Methyl bromide (bromomethane)		100.08	493.03	72,188.60	9,047.60	81,829.32	280,000.00
74-87-3	Methyl chloride (chloromethane)		203.80	39,082.66	20.06		39,306.51	
74-88-4	Methyl iodide (iodomethane)			431.96			431.96	
75-00-3	Ethyl chloride (chloroethane)		18.50	0.0025	24.60		43.10	
75-01-4	Vinyl chloride		89.66	505.75	107.40		702.81	
75-05-8	Acetonitrile	1,859.00		0.01			1,859.01	
75-07-0	Acetaldehyde	0.06	5,274.58	128,850.30	1,136.50		135,261.43	
75-09-2	Methylene chloride	13,938.00	1,567.11	9,895.23	471.08		25,871.42	
75-15-0	Carbon disulfide		1,895.26	9,567.86	79.42		11,542.54	
75-25-2	Bromoform		6.60				6.60	
75-34-3	Ethylidene dichloride (1,1-dichloroethane)			0.00	117.02		117.02	
75-35-4	Vinylidene chloride		3.20		14.23		17.43	
75-56-9	Propylene oxide		55.30		102.66		157.96	
7647-01-0	Hydrogen chloride (hydrochloric acid)	11.49	25,702.50	138,291.02	48,552.53		212,557.54	
7664-39-3	Hydrogen fluoride	2,444.15	25,000.00	524.21	1,130.00		29,098.36	
7723-14-0	Phosphorus Metal, Yellow or White		698.80	799.34	11.12	0.16	1,509.42	
7738-94-5	Chromic acid (VI)	1.00	17.12	2.49	0.53	0.0044	21.15	
77-78-1	Dimethyl sulfate		8.10				8.10	
7782-50-5	Chlorine	1,244.00	3,775.40	8,683.64	92,835.70		106,538.74	

Chemical Abstracts Service (CAS) No.	Pollutant Name	Counties in Area of Interest						Malec Brothers Potential emissions (lbs/yr)
		Bladen (lbs/yr)	Brunswick (lbs/yr)	Columbus (lbs/yr)	New Hanover (lbs/yr)	Pender (lbs/yr)	Total (lbs/yr)	
78-59-1	Isophorone		98.00	1.22			99.22	
78-87-5	Propylene dichloride (1,2-dichloropropane)		157.22	71.70	4.15		233.07	
79-00-5	Trichloroethane, 1,1,2-			219.57			219.57	
79-01-6	TCE (trichloroethylene)		142.92	588.40	142.78		874.10	
79-34-5	Tetrachloroethane, 1,1,2,2-			0.21	18.75		18.96	
80-62-6	Methyl methacrylate		3.40	4.80		660.20	668.40	
84-74-2	Dibutylphthalate			118.45	15.11		133.56	
87-86-5	Pentachlorophenol		9.95	0.16			10.11	
88-06-2	Trichlorophenol, 2,4,6-		0.10	0.80			0.90	
91-20-3	Naphthalene	1.09	492.42	9,300.40	250.42		10,044.33	
92-52-4	Biphenyl			231.58	2.25		233.83	
95-47-6	Xylene, o-		1,274.00	3,648.58	0.01		4,922.59	
98-82-8	Cumene		1.01	4,308.39			4,309.40	
98-86-2	Acetophenone		190.2200	9,210.4659			9,400.69	
ASC (7778394)	Arsenic & Compounds (total mass of elemental AS, arsine and all inorganic compounds)	0.50751	117.40	105.89	8.68	0.02	232.50	
BEC	Beryllium & compounds (Total mass)	0.04	5.2484	6.29	0.97	0.0015	12.54	
CDC	Cadmium & compounds (total mass includes elemental metal)	1.44	22.22	58.18	46.16	0.0002	128.00	
CNC	Cyanide & compounds (see also hydrogen cyanide)			58.74			58.74	
COC	Cobalt & compounds	29.63	144.59	33.20	3.95	3.11	214.48	

Chemical Abstracts Service (CAS) No.	Pollutant Name	Counties in Area of Interest						Malec Brothers Potential emissions (lbs/yr)
		Bladen (lbs/yr)	Brunswick (lbs/yr)	Columbus (lbs/yr)	New Hanover (lbs/yr)	Pender (lbs/yr)	Total (lbs/yr)	
CRC	Chromium - All/Total (includes Chromium (VI) categories, metal and others)		87.79	96.23	5,043.65	1.25	5,228.92	
18540299	Chromium (VI)		0.43	49.43	112.03	0.06	161.95	
GLYET	Glycol ethers (total all individual glycol ethers)	342.89					342.89	
HGC	Mercury & Compounds - all total mass includes Hg Vapor	0.36	1.25	25.78	36.73		64.12	
MNC	Manganese & compounds	0.54	7,899.57	1,772.95	570.51	0.25	10,243.82	
NIC	Nickel & Compounds, sum total mass includes elemental	2.73	164.32	199.19	2,339.29	12.47	2,717.99	
PBC	Lead & compounds	0.48	285.77	168.51	32.71	0.02	487.49	
POM	Polycyclic Organic Matter		0.0004	9,915.11			9,915.11	
SBC	Antimony & Compounds (total mass, inc elemental SB)		37.65	43.92			81.57	
SEC	Selenium Compounds	0.16	17.60	19.81	3.35	0.00	40.91	
	<b>Sum</b>	<b>75,392.24</b>	<b>181,218.05</b>	<b>3,008,054.20</b>	<b>324,609.89</b>	<b>15,964.05</b>	<b>3,605,238.45</b>	<b>280,000.00</b>

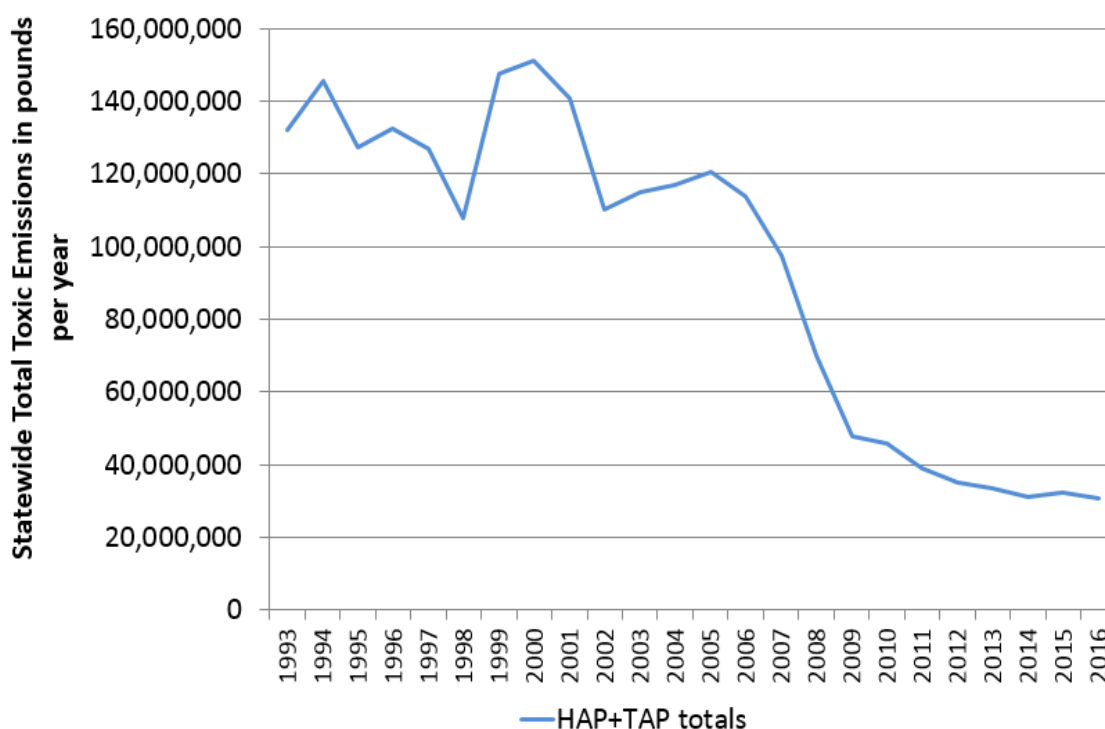
## 2.4 State Toxic Air Pollutants

The Clean Air Act amendments of 1990 originally identified 189 Hazardous Air Pollutants, or HAPs, for regulation. HAPs are pollutants "known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects" [Section 112 (b)]. There are currently 187 federal HAPs following the delisting of caprolactam in 1996 and methyl ethyl ketone in 2005.

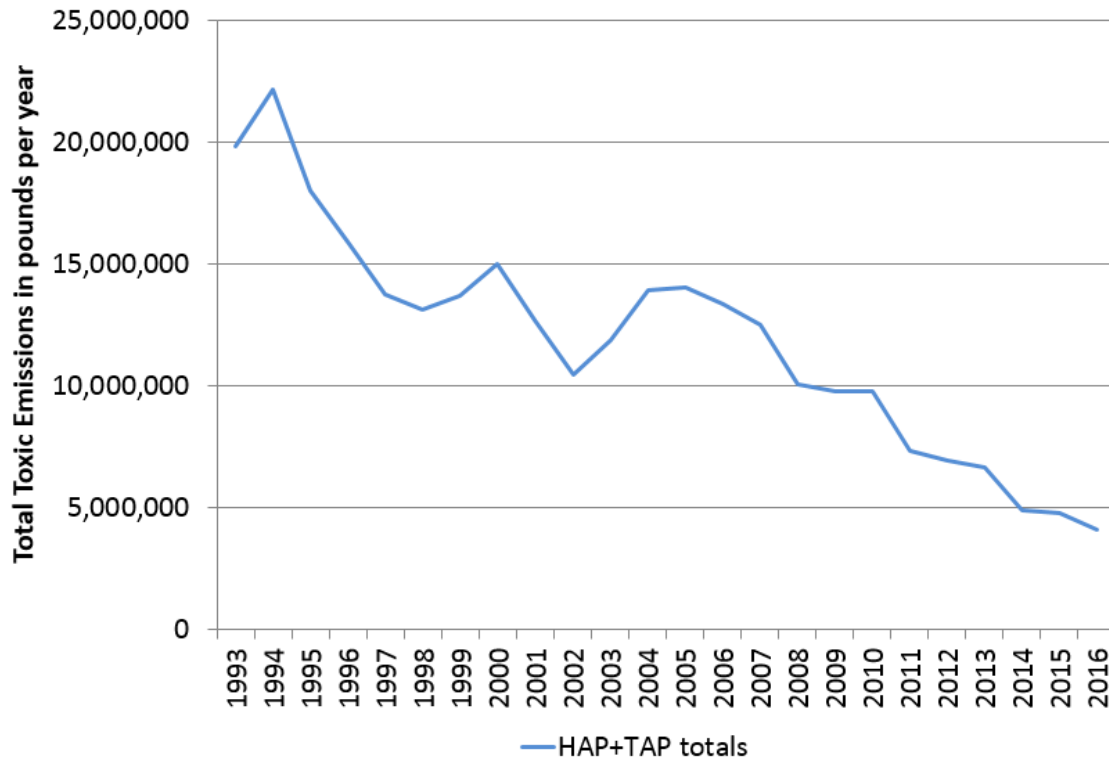
HAPs may be emitted from stationary sources (industrial processes) or mobile sources (cars, trucks and other vehicles).

North Carolina has a health-based toxic air pollutant control program that regulates 97 Toxic Air Pollutants or TAPs. The North Carolina Air Toxics program focuses on chemicals emitted by stationary sources. Twenty (20) of the 97 North Carolina TAPs are not classified as HAPs while 77 pollutants are common to both lists.

The tables that follow quantify the HAPs and TAPs emitted in the area of interest currently and the potential impact of the emissions of the Malec Brothers Transport facility to this area. Graphs of HAP and TAP emissions from 1993 to 2016 are a visual representation of pollutant trends for the area.



**Figure 2.3 Statewide Toxic Pollutant Totals Trend (1993-2016)**



**Figure 2.4 Area of Interest Counties Toxic Pollutant Totals Trend (1993-2016)**

**Table 2.5 Toxic Air Pollutants Summary**

	Total for 15 TAPs (lbs/yr)	% State Total for 15 TAPs	State Total for all 20 TAPs (lbs/yr)	% State Total for all 20 TAPs
Bladen	55,364.08	0.42%		0.42%
Brunswick	500,606.81	3.77%		3.77%
Columbus	631,268.15	4.75%		4.75%
New Hanover	64,085.24	0.48%		0.48%
Pender	-	0.00%		0.00%
Total for five counties	1,251,324.27	9.42%	1,251,324.27	9.42%
State total	13,281,211.24		13,287,988.19	

CAS	Pollutant Name	Bladen (lb/yr)	Brunswick (lb/yr)	Columbus (lb/yr)	New Hanover (lb/yr)	Pender (lb/yr)	Total for Area of Interest	State total	% of State total
141-78-6	Ethyl acetate	2,031.97	393,295.96		10,697.60		406,025.53	1,122,832.56	36%
16984-48-8	Fluorides	2,445.95	25,000.00	524.21	1,970.47		29,940.63	666,384.73	4%
64-19-7	Acetic acid	950.00	91.18		44.00		1,085.18	396,977.55	0%
74-93-1	Methyl mercaptan	3.10		120,213.68	99.18		120,315.96	357,399.12	34%
75-08-1	Ethyl mercaptan				134.43		134.43	1,924.44	7%
75-69-4	CFC-11		195.33	29.18			224.51	1,608.29	14%
75-71-8	CFC-12				337.81		337.81	14,515.53	2%
76-13-1	CFC- 113	1,354.70					1,354.70	1,504.80	90%
7664-41-7	Ammonia (as NH3)	45,521.84	2,562.34	237,734.39	5,904.34		291,722.91	2,698,396.36	11%
7664-93-9	Sulfuric acid	347.40	72,522.29	37,314.06	32,804.61		142,988.37	2,472,453.46	6%
7697-37-2	Nitric acid	109.00			142.80		251.80	4,482.18	6%
7726-95-6	Bromine	26.00					26.00	68.85	38%
7783-06-4	Hydrogen sulfide	1,944.29	1.33	206,325.45	1,361.56		209,632.63	2,319,813.41	9%
78-93-3	MEK	629.82	6,938.38	28,438.83	9,248.07		45,255.10	1,042,245.85	4%
HEXANEISO	Hexane isomers, except n-hexane			688.35	1,340.37		2,028.72	2,180,604.14	0%
County totals		55,364.08	500,606.81	631,268.15	64,085.24	0.00	1,251,324.27	13,281,211.24	

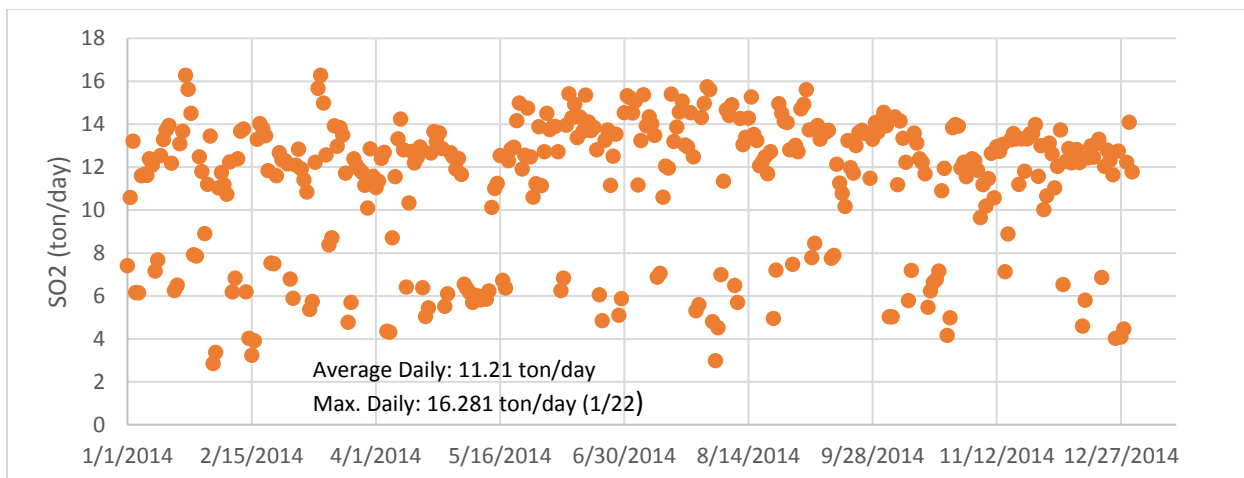
Notes:

Listed TAP only emissions are the TAP emissions reported for these five counties that are not also HAPs. There are 20 TAPs that are not also HAPs. State total represents emissions data for 97 counties administered by NCDAQ.

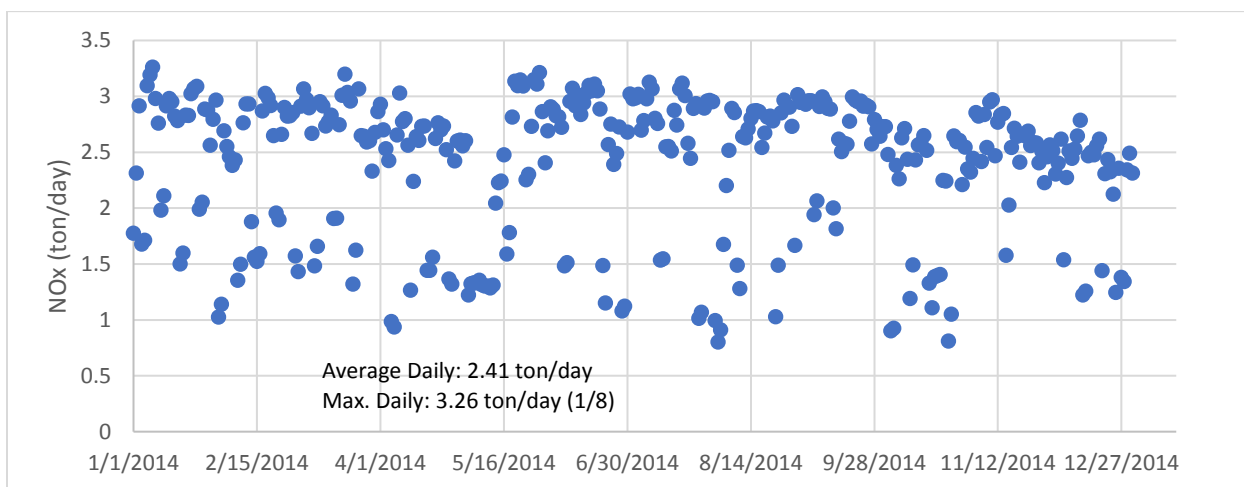
## 2.5 North Carolina Power Plant Emissions Data

The following charts show calendar year 2014 daily emissions of NO<sub>x</sub>, SO<sub>2</sub> and CO<sub>2</sub> in short tons from the two electricity generating facilities operating in the area of interest. The CPI USA North Carolina Southport Plant in Brunswick County began operating in 2005. It is a 135 megawatt (MW) capacity cogeneration steam plant that combusts wood as a primary fuel and coal and tire derived fuel as secondary fuels. The LV Sutton Plant owned by Duke Energy Progress is located in New Hanover County. It now operates a 625-megawatt natural gas combined-cycle plant, which provides highly efficient base load electric generation. Duke Energy Progress retired the coal-fired units in November 2013 when the combined-cycle units came online.



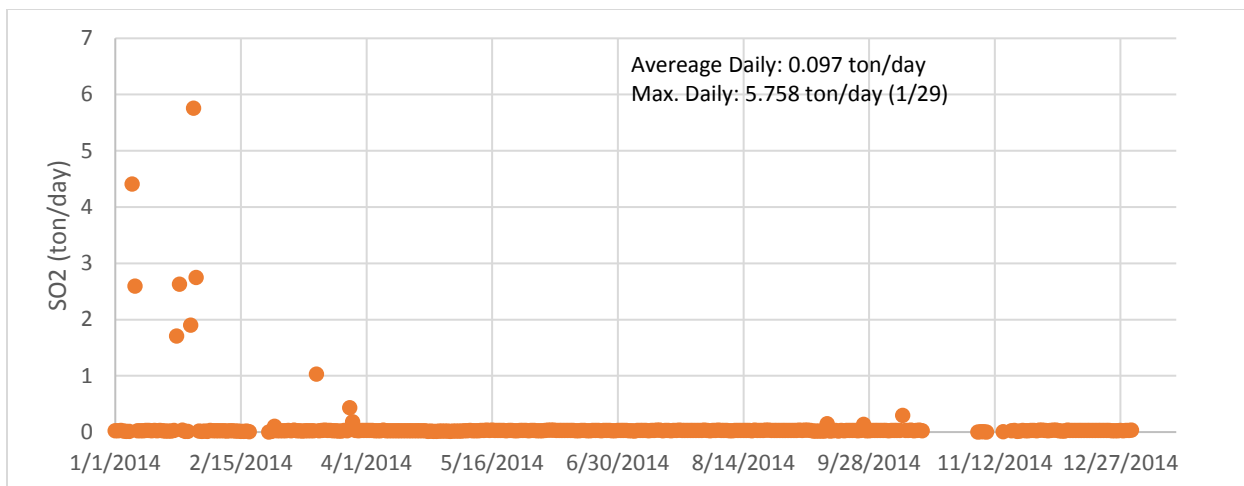


**Figure 2.5 CPI USA Southport Plant Facility Level 2014 Daily SO<sub>2</sub> Emissions (tons)**

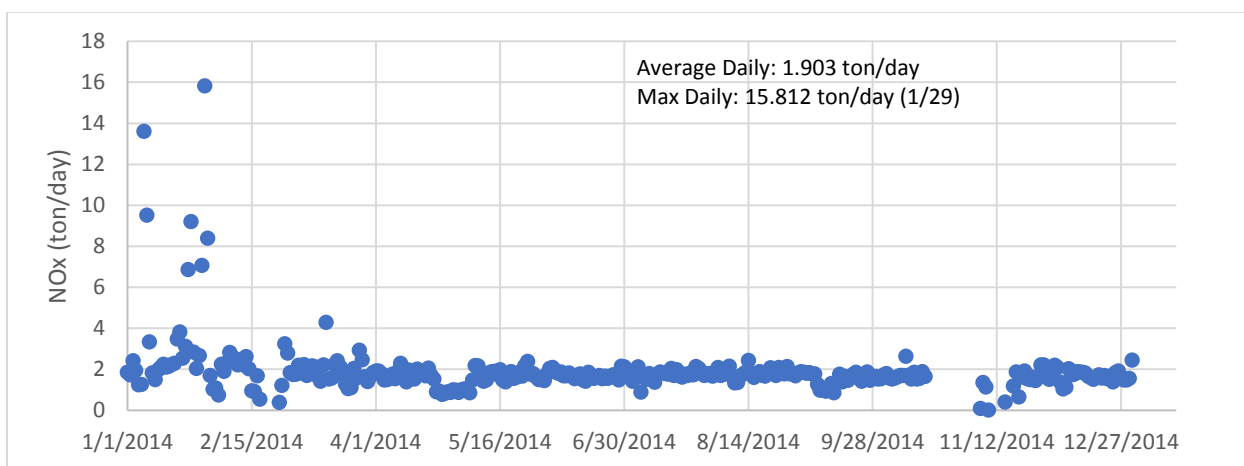


**Figure 2.6 CPI USA Southport Plant Facility Level 2014 Daily NO<sub>x</sub> Emissions (tons)**

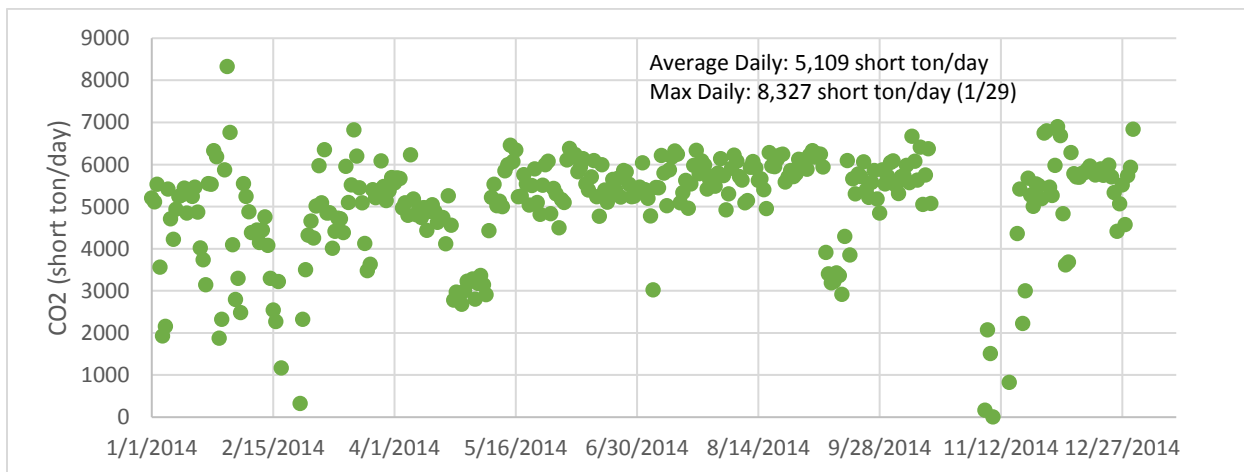
\*Note: CPI USA North Carolina Southport Plant did not report daily CO<sub>2</sub> emission in 2014. However, facility-wide annual emissions were reported. See Section 2.7 for annual emissions data.



**Figure 2.7 L V Sutton Plant Facility Level 2014 Daily SO<sub>2</sub> Emissions (tons)**



**Figure 2.8 L V Sutton Plant Facility Level 2014 Daily NO<sub>x</sub> Emissions (tons)**

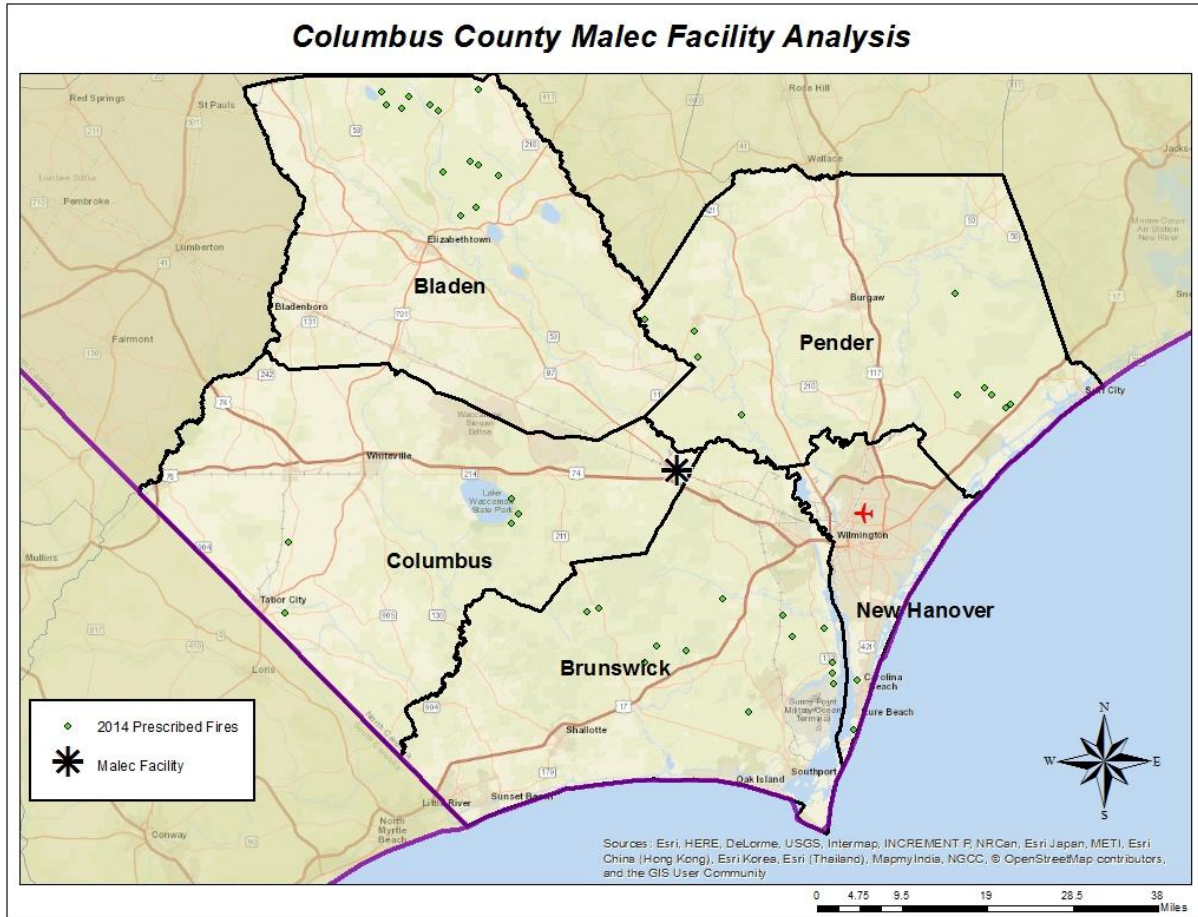


**Figure 2.9 L V Sutton Plant Facility Level 2014 Daily CO<sub>2</sub> Emissions (short tons)**

## 2.6 Prescribed Fires and Wildfire Events

Prescribed fires are fires that are intentionally ignited to meet specific management objectives such as ecosystem restoration and wildfire hazard reduction. Wildfires are fires started by an unplanned ignition caused by, for example, lightning or other acts of nature, accidental human-caused actions, or a prescribed fire that has developed into a wildfire. These fire events generate air pollutants (PM<sub>2.5</sub>, NO<sub>x</sub>, CO, VOC) that are tracked by North Carolina and EPA annually to understand their overall contribution to total emissions in the state and locally.

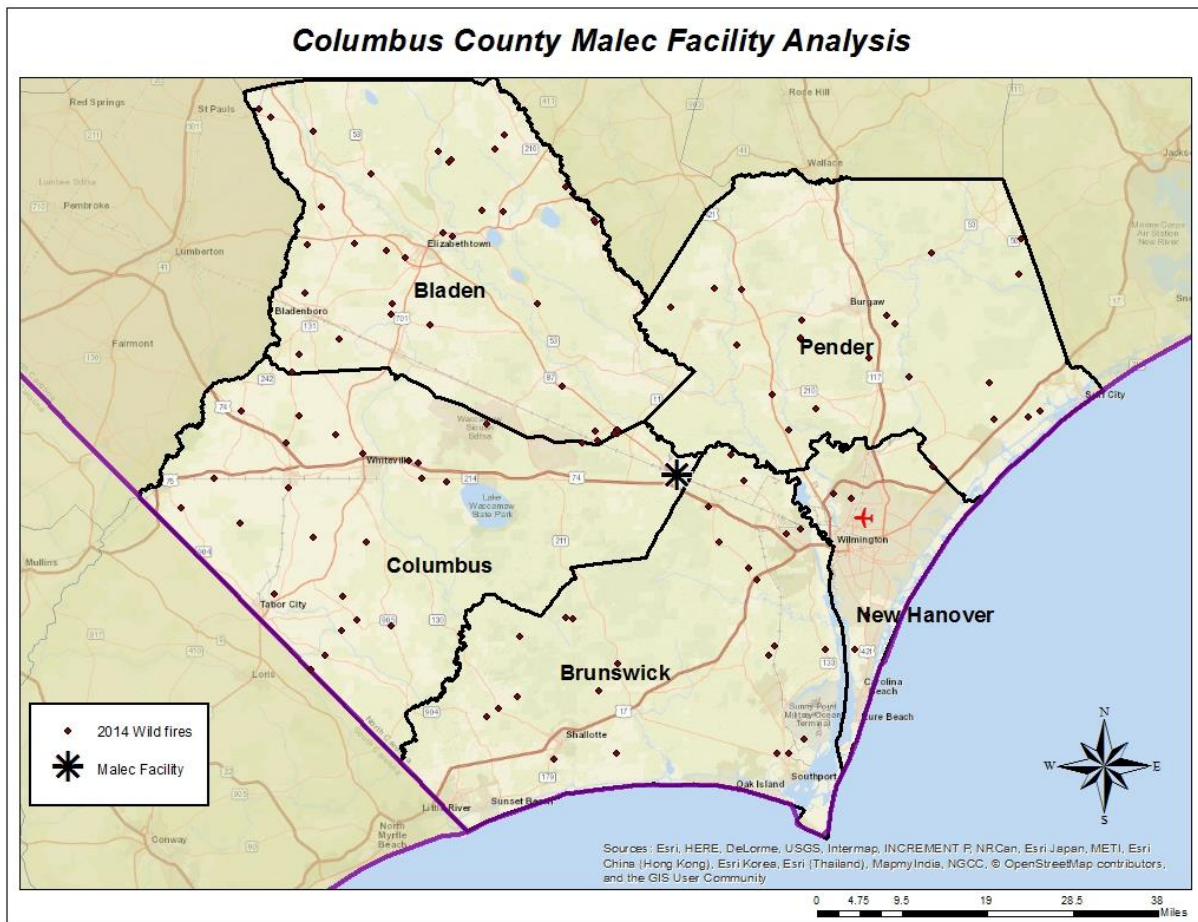
The following maps and tables show the total number of fires and total acres burned by prescribed fires and wildfires in the area of interest for 2014. Data for NC 2014 were obtained from the 2014 NEIv1.



**Figure 2.10 Area of Interest - 2014 Prescribed Fire Locations**

**Table 2.6 Number and Acres Burned for 2014 Prescribed Fires**

2014	No. of Prescribed Fires	Acres Burned
North Carolina State Total	1,018	128,547
Bladen, Brunswick, Columbus, New Hanover, Pender Counties	46	2,992
Percent of State Total	4.5%	2.3%



**Figure 2.11 Area of Interest - 2014 Wildfire Locations**

**Table 2.7 Number and Acres Burned for 2014 Wildfires**

2014	No. of Wild Fires	Acres Burned
North Carolina State Total	2,658	25,053
Bladen, Brunswick, Columbus, New Hanover, Pender Counties	132	1,818
Percent of State Total	5.0%	7.3%

## 2.7 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are air pollutants that trap heat in the atmosphere. The three primary GHGs emitted by fossil and biomass fuel combustion are CO<sub>2</sub>, methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). Methane is also emitted by landfills and agricultural sources due to the decomposition of biomass. Lastly, fluorinated gases including hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. The source of these gases in this inventory; however, is from the production of fluorinated gases for use by industry.

Each gas has a different atmospheric lifetime and different ability to absorb heat. Therefore, it is common to calculate the tons of emissions of CH<sub>4</sub> and N<sub>2</sub>O on the basis of CO<sub>2</sub>. This basis is termed “as CO<sub>2</sub> equivalent” (CO<sub>2</sub>e). Note that fluorinated gases are generally emitted in small amounts but have a high global warming potential.

In addition, CO<sub>2</sub> that is emitted from the combustion of biomass material is considered “carbon neutral”. This means that the emitted CO<sub>2</sub> does not contribute to global warming since an equivalent amount is re-sequestered by re-growing the biomass, making the net carbon emissions equal to zero. Although many factors influence the carbon sequestration process, a scientific consensus has not been fully developed regarding the best approach for addressing carbon neutrality. For the purpose of this emissions inventory, we have assumed that biomass related CO<sub>2</sub> emissions are not included in the total GHG emissions as CO<sub>2</sub>e.

The GHG emissions for the proposed Malec Brothers Transport, LLC Plant were obtained from the proposed air quality permit review and are presented in the following table.<sup>6</sup> Methyl bromide is a GHG with a global warming potential of 5 over a 100-year period compared to CO<sub>2</sub>.

Therefore, for the Malec Brothers Transport facility, the potential methyl bromide emissions of 140 tons per year is multiplied by 5 to convert the emissions to a CO<sub>2</sub>e basis.

**Table 2.8 Proposed Malec Brothers Transport, LLC Plant  
Project Potential Emissions in tons per year as CO<sub>2</sub>e**

Source	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Methyl Bromide CH <sub>3</sub> Br	Total GHG as CO <sub>2</sub> e	Biogenic CO <sub>2</sub>
Fumigation Process				700	700	0
<b>Project Total GHG</b>					<b>700</b>	<b>0</b>

<sup>6</sup> Proposed Application Review for Malec Brothers Transport, LLC, North Carolina Division of Air Quality, accessed via IBEAM on April 3, 2018.



Emissions data for each sector was obtained from several sources:

- EGU and Non-EGU point source data for facilities reporting 25,000 metric tons CO<sub>2</sub>e per year or greater obtained from the EPA 2014 Facility Level Information on Greenhouse Gases Tool (FLIGHT)<sup>7</sup>
- GHG emissions data submitted voluntarily by Non-EGU point sources to the DAQ through the Internet-based Enterprise Application Management (IBEAM) data system and obtained from the internal 2014 North Carolina Multi-Pollutant Inventory Database.
- EPA 2014 NEI Version 1 for on-road and nonroad mobile sources and wildfires and prescribed burning.<sup>8</sup>

The following two tables present the GHG emissions from the various sectors by county and by GHG for the total area of interest in tons as CO<sub>2</sub>e. Potential methyl bromide emissions estimated for the Malec Brothers Transport facility in Columbus County are reported on a CO<sub>2</sub>e basis at the bottom of the tables.

Note that the Non-EGU point source GHG data is not complete. Only a small number of facilities are required to report GHG emissions to EPA or opt to voluntarily report GHG emissions to North Carolina. The GHG emissions for Non-EGU point source facilities included in this report represent 47 percent of the total number of these facilities reporting to the NEI in the five North Carolina counties composing the area of interest for this study. Therefore, actual GHG emissions in the area of interest are higher than shown in the table below.

---

<sup>7</sup> United States Environmental Protection Agency, “Facility Level Information on Greenhouse Gases Tool” (FLIGHT), 2014 Data for NC, available from <https://ghgdata.epa.gov/ghgp/main.do>, accessed on April 3, 2018.

<sup>8</sup> United States Environmental Protection Agency, “Air Emissions Inventories, 2014 National Emissions Inventory (NEI) Data,” available from <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>, accessed January 2018.

**Table 2.9 2014 Total GHG Emissions by County (tons CO<sub>2</sub>e)**

Source	Bladen	Brunswick	Columbus	New Hanover	Pender	Total Area of Interest
EGU		372,880		1,697,959		2,070,838
Non-EGU Point <sup>9</sup>	462,964	9,559	436,904	361,197	19	1,270,644
Nonpoint						
Fires	1,529	2,710	413	198	5,987	10,838
Mobile - Onroad	208,740	773,378	377,373	877,643	372,811	2,609,945
Mobile - Nonroad	28,003	79,806	41,477	141,499	29,923	320,708
<b>Total</b>	<b>701,236</b>	<b>1,238,333</b>	<b>856,167</b>	<b>3,078,496</b>	<b>408,740</b>	<b>6,282,973</b>
<i>Biogenic CO<sub>2</sub></i>	<i>26,143</i>	<i>555,008</i>	<i>2,051,681</i>	<i>1,252</i>	<i>63,514</i>	<i>2,697,598</i>
<b>Malec Brothers GHG</b>			<b>700</b>			<b>700</b>
<b>Total with Malec Brothers</b>	<b>701,236</b>	<b>1,238,333</b>	<b>856,867</b>	<b>3,078,496</b>	<b>408,740</b>	<b>6,283,673</b>

**Table 2.10 2014 Total GHG Emissions in the Area of Interest (tons CO<sub>2</sub>e)**

Sector	Carbon Dioxide (CO <sub>2</sub> )	Methane (CH <sub>4</sub> )	Nitrous Oxide (N <sub>2</sub> O)	HFC and other Fluorinated GHG	Other GHGs	Methyl Bromide (CH <sub>3</sub> Br)	Total Area of Interest GHG as CO <sub>2</sub> e	Biogenic CO <sub>2</sub> e
EGU	2,054,420	5,046	11,372			0.24	2,070,838	522,842
Non-EGU Point <sup>7</sup>	573,438	314,020	6,565	354,864	21,556	201	1,270,644	2,066,552
Nonpoint								
Fires		10,838					10,838	108,204
Onroad	2,584,892	2,577	22,476				2,609,945	
Nonroad	317,585	3,123					320,708	
<b>Total</b>	<b>5,530,335</b>	<b>335,604</b>	<b>40,413</b>	<b>354,864</b>	<b>21,556</b>	<b>201</b>	<b>6,282,973</b>	<b>2,697,598</b>
<b>Malec Brothers GHG</b>						<b>700</b>	<b>700</b>	
<b>Total with Malec Brothers</b>	<b>5,530,335</b>	<b>335,604</b>	<b>40,413</b>	<b>354,864</b>	<b>21,556</b>	<b>901</b>	<b>6,283,673</b>	<b>2,697,598</b>

<sup>9</sup> Represents emissions from a limited number of facilities that are required to report to EPA or voluntarily reported emissions to North Carolina. Actual non-EGU point emissions are expected to be higher than reported above.



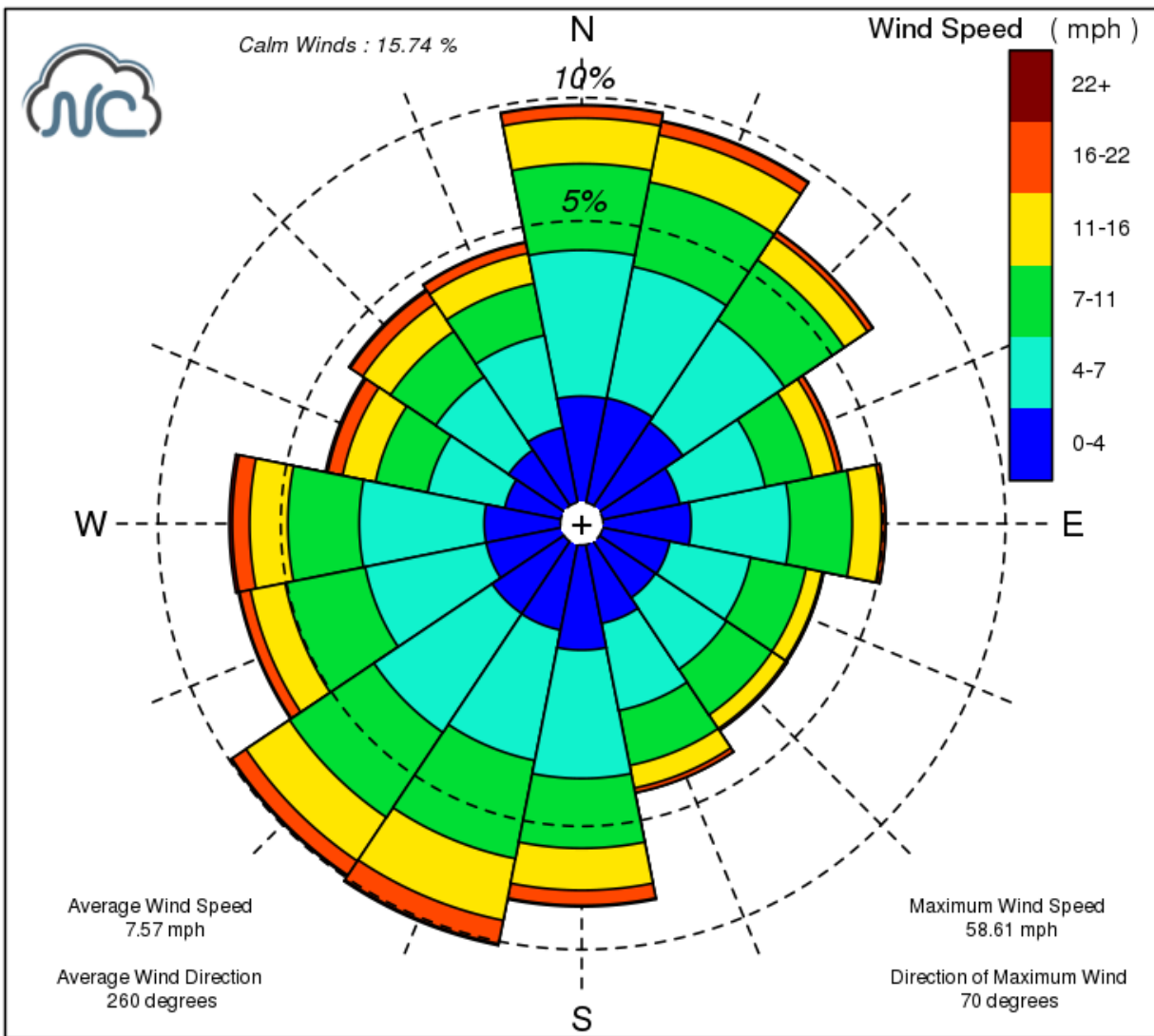
### **3 Wind Rose**

A wind rose is a graphical tool used to show wind speed and wind direction for a particular location over a specified period of time. The wind rose is divided into a number of spokes, which represent the frequency of winds blowing from a particular direction. For example, the longest spoke on the wind rose represents the greatest frequency of winds blowing from that particular direction over the specified time frame.

To get the most representative wind rose for a given location, a sufficiently long period of record is needed. After a careful review of the data from the weather stations in closest proximity to the Malec Brothers Transport site, we found that the New Hanover Regional Airport (KILM) -- an Automated Surface Observing System (ASOS) site owned and operated by the Federal Government -- was the most representative for the area as it contains a near-continuous data history through 1988.

In examining the KILM wind rose, there are two dominant wind directions: south/southwesterly and north/northeasterly, evidenced by the spokes that extend near and beyond the 10%+ frequency for the 30-year monitoring period.

## Wind Rose for New Hanover County Airport (KILM) Mar. 29, 1988 to Mar. 29, 2018

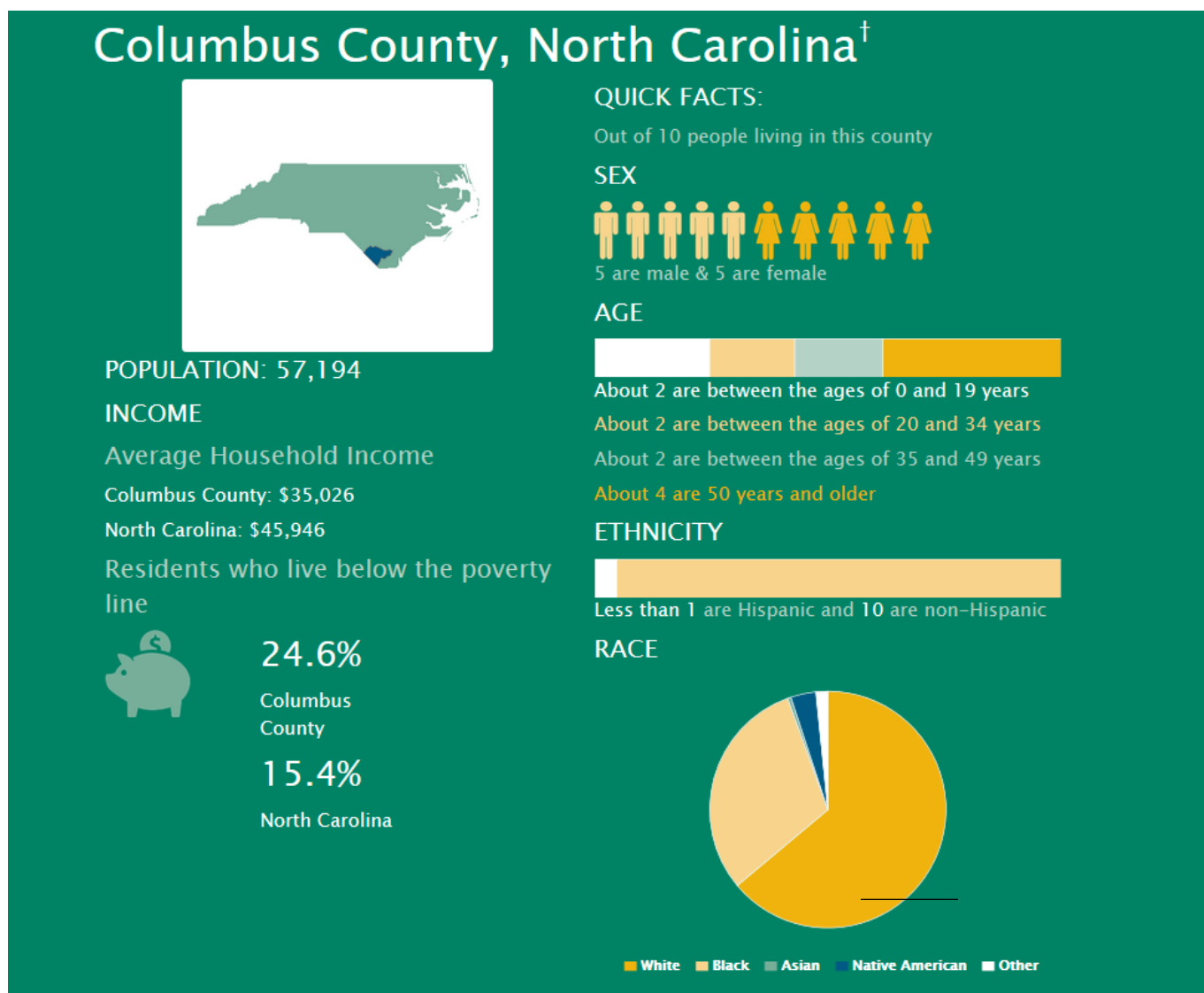


**Figure 3.1 Wind Rose for New Hanover County Airport**

Source: ASOS station installed and maintained by the Federal Aviation Administration

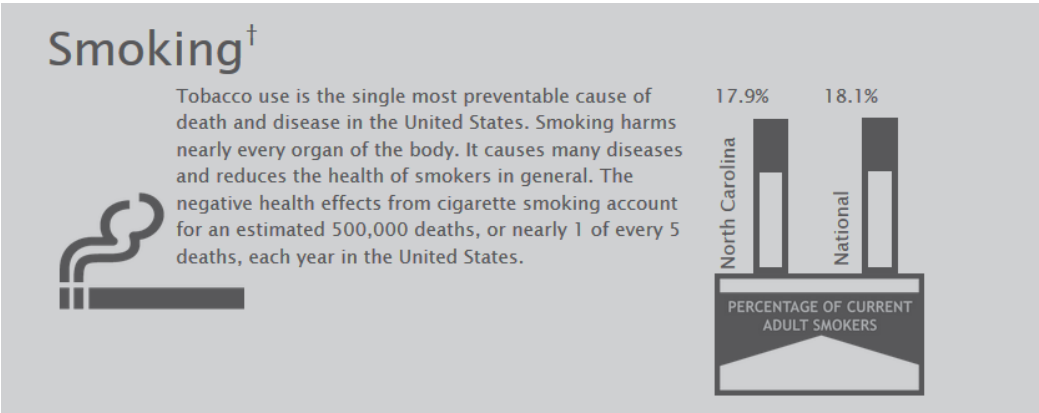
## **4 Demographic and Socioeconomic Data**

#### 4.1 CDC Statistics for Columbus County

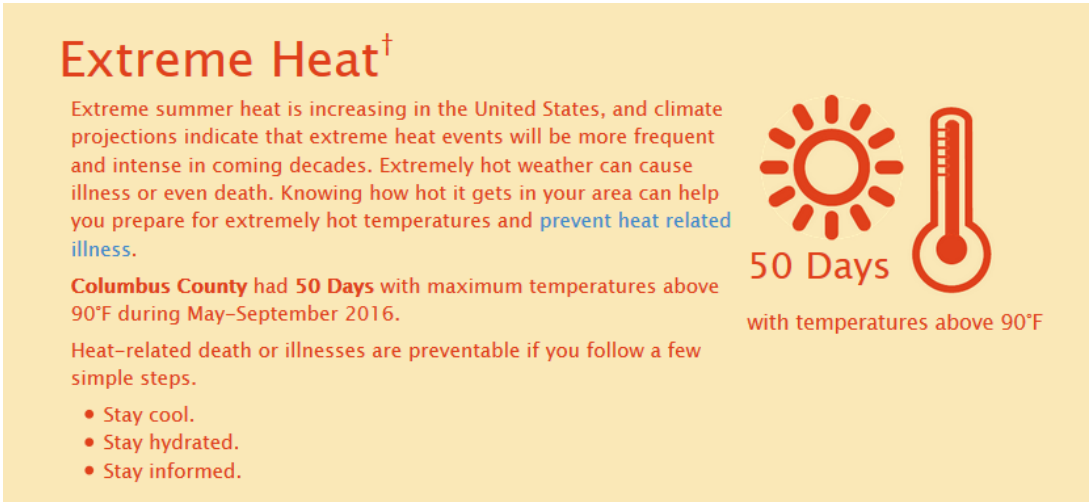


Source: Centers for Disease Control

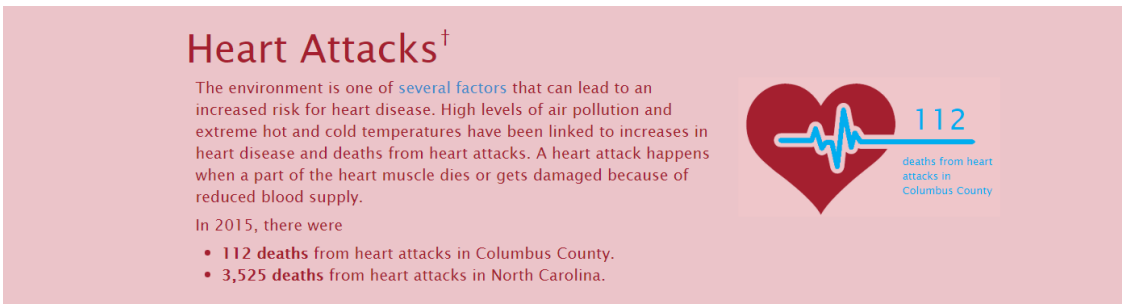
Columbus County



Source: Centers for Disease Control

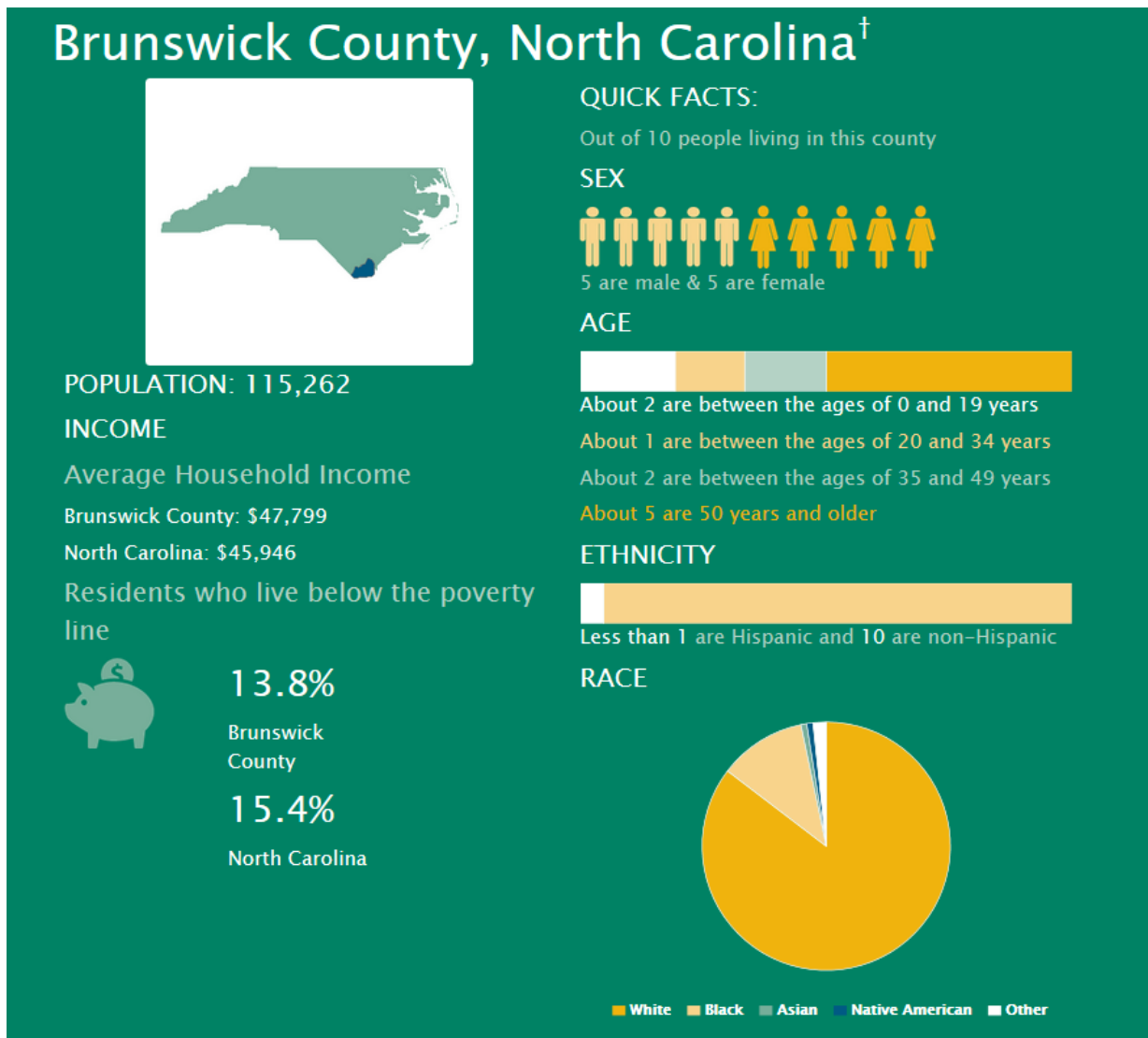


Source: Centers for Disease Control



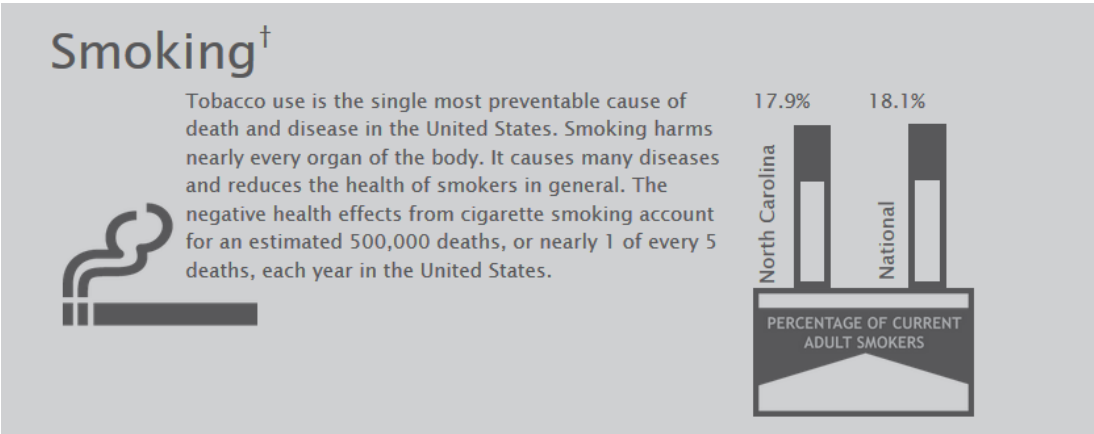
Source: Centers for Disease Control

## 4.2 CDC Statistics for Brunswick County

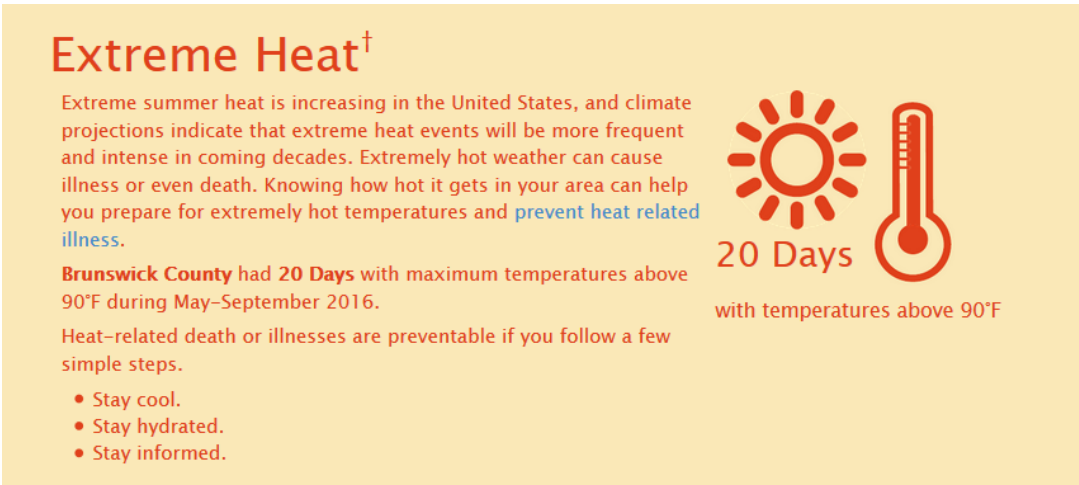


Source: Centers for Disease Control

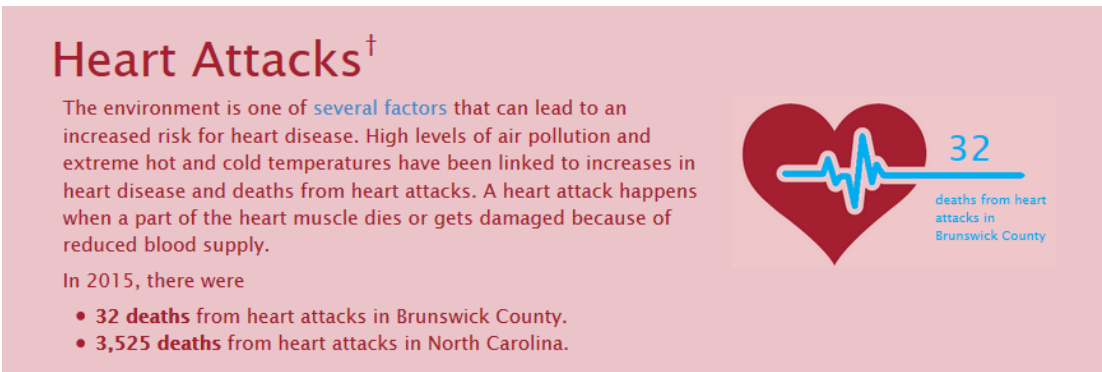
Brunswick County



Source: Centers for Disease Control

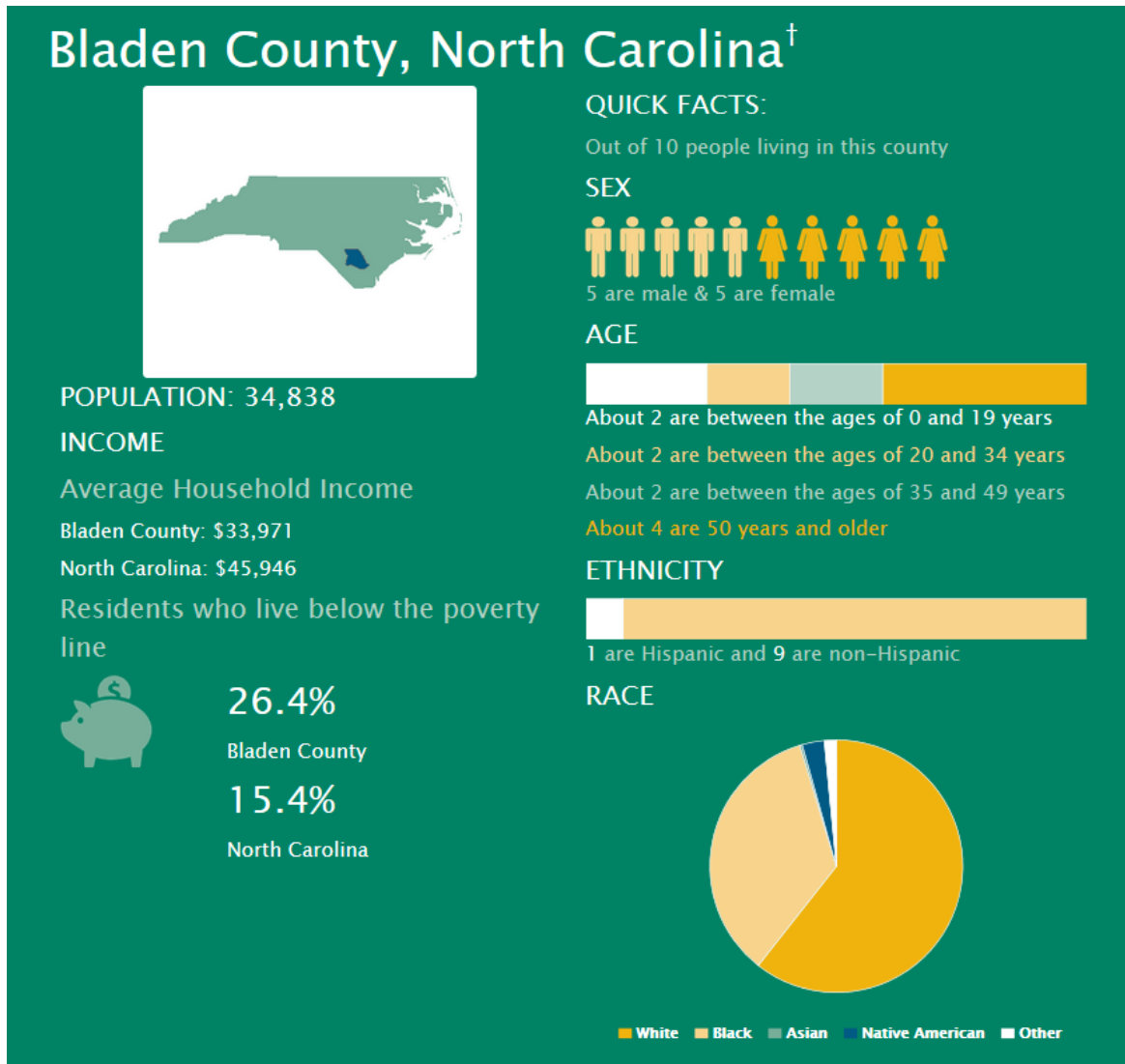


Source: Centers for Disease Control



Source: Centers for Disease Control

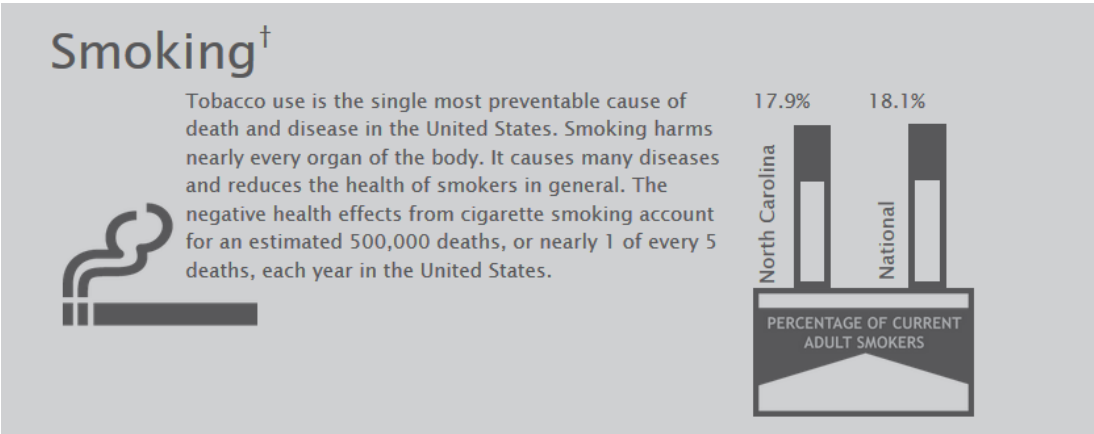
### 4.3 CDC Statistics for Bladen County



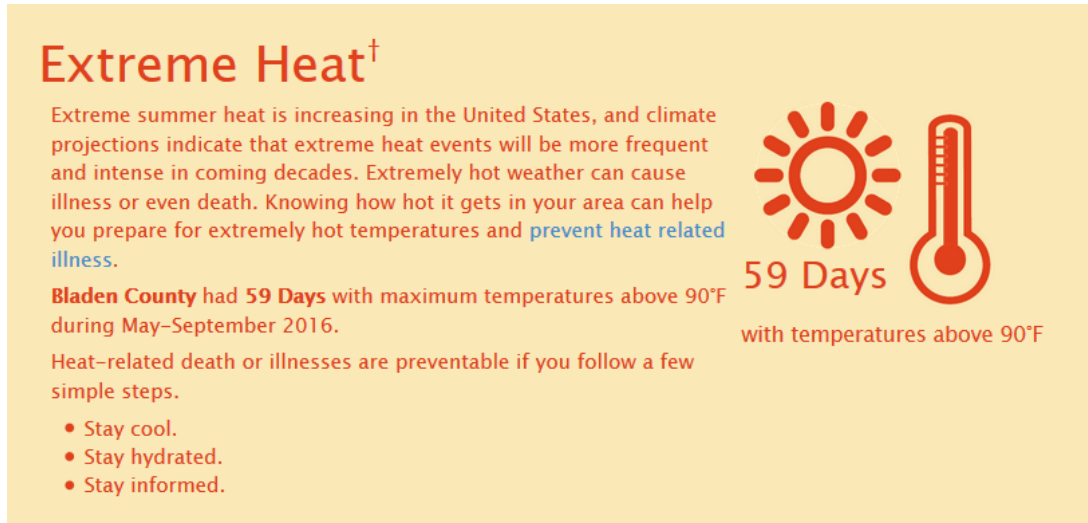
Source: Centers for Disease Control



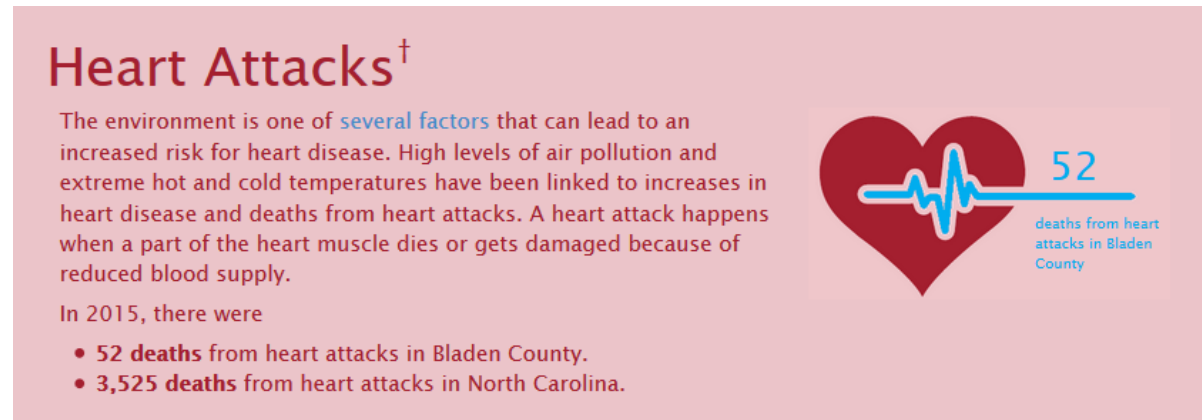
Bladen County



Source: Centers for Disease Control

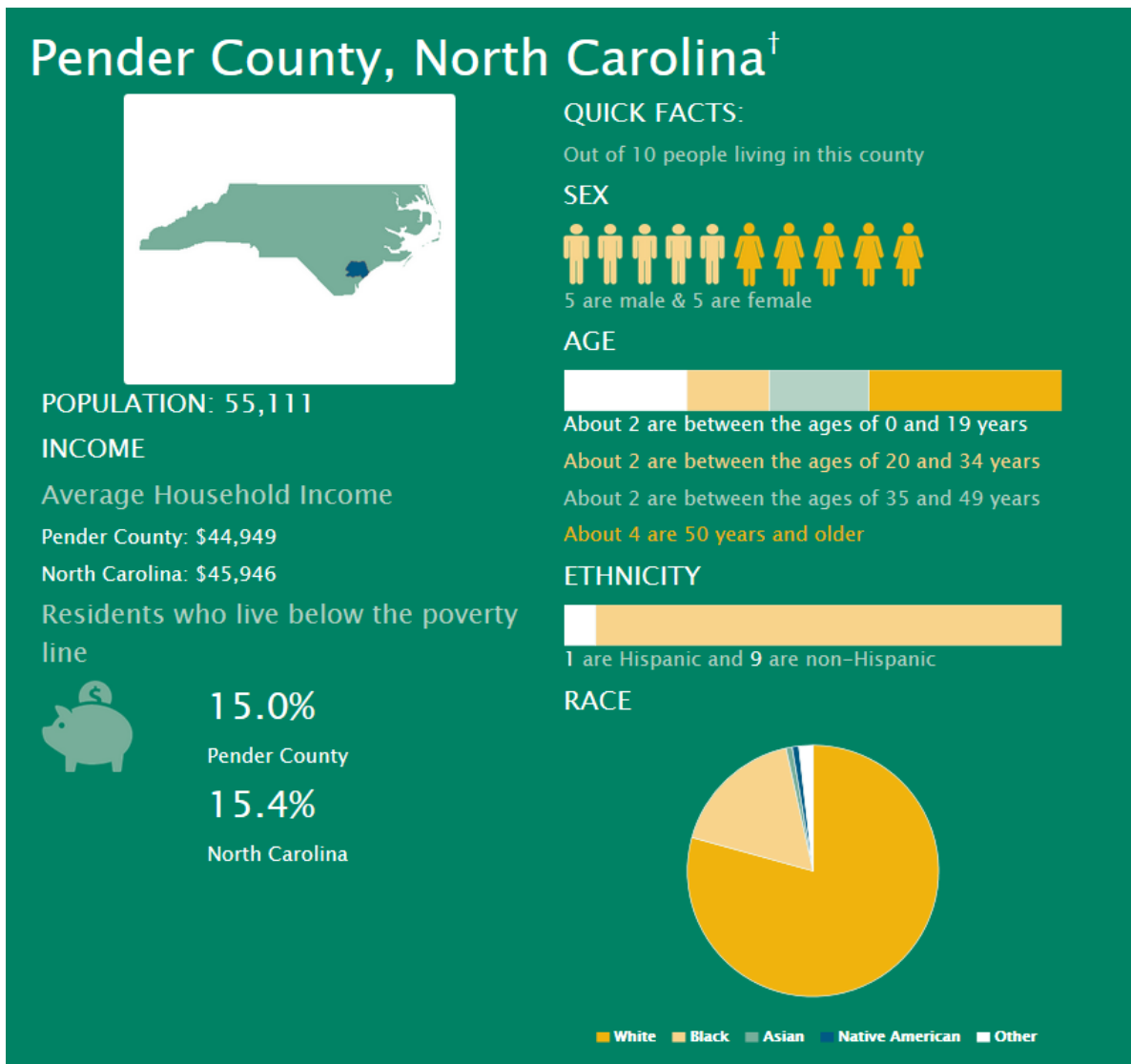


Source: Centers for Disease Control



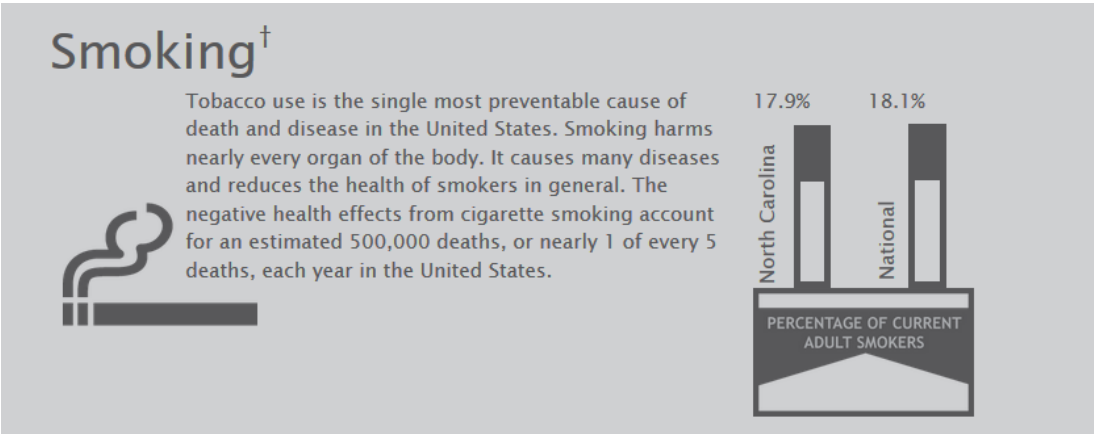
Source: Centers for Disease Control

#### 4.4 CDC Statistics for Pender County

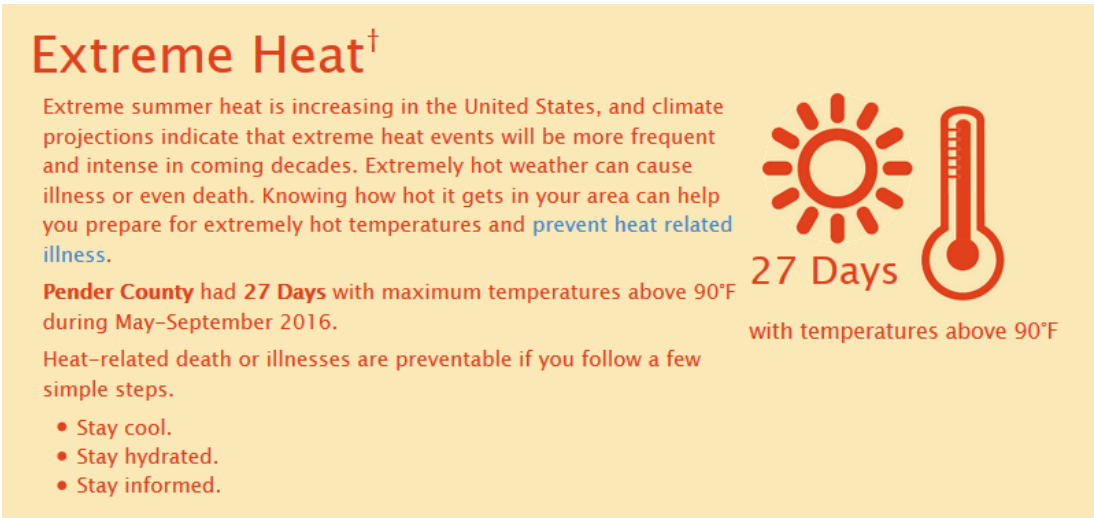


Source: Centers for Disease Control

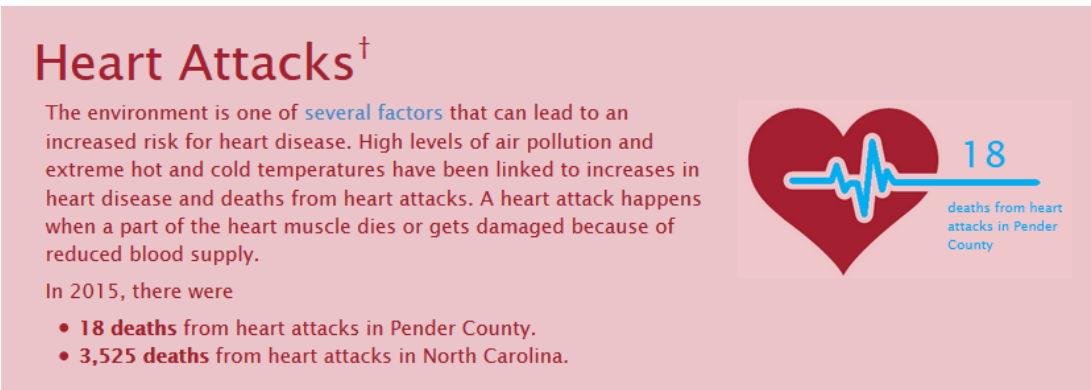
Pender County



Source: Centers for Disease Control

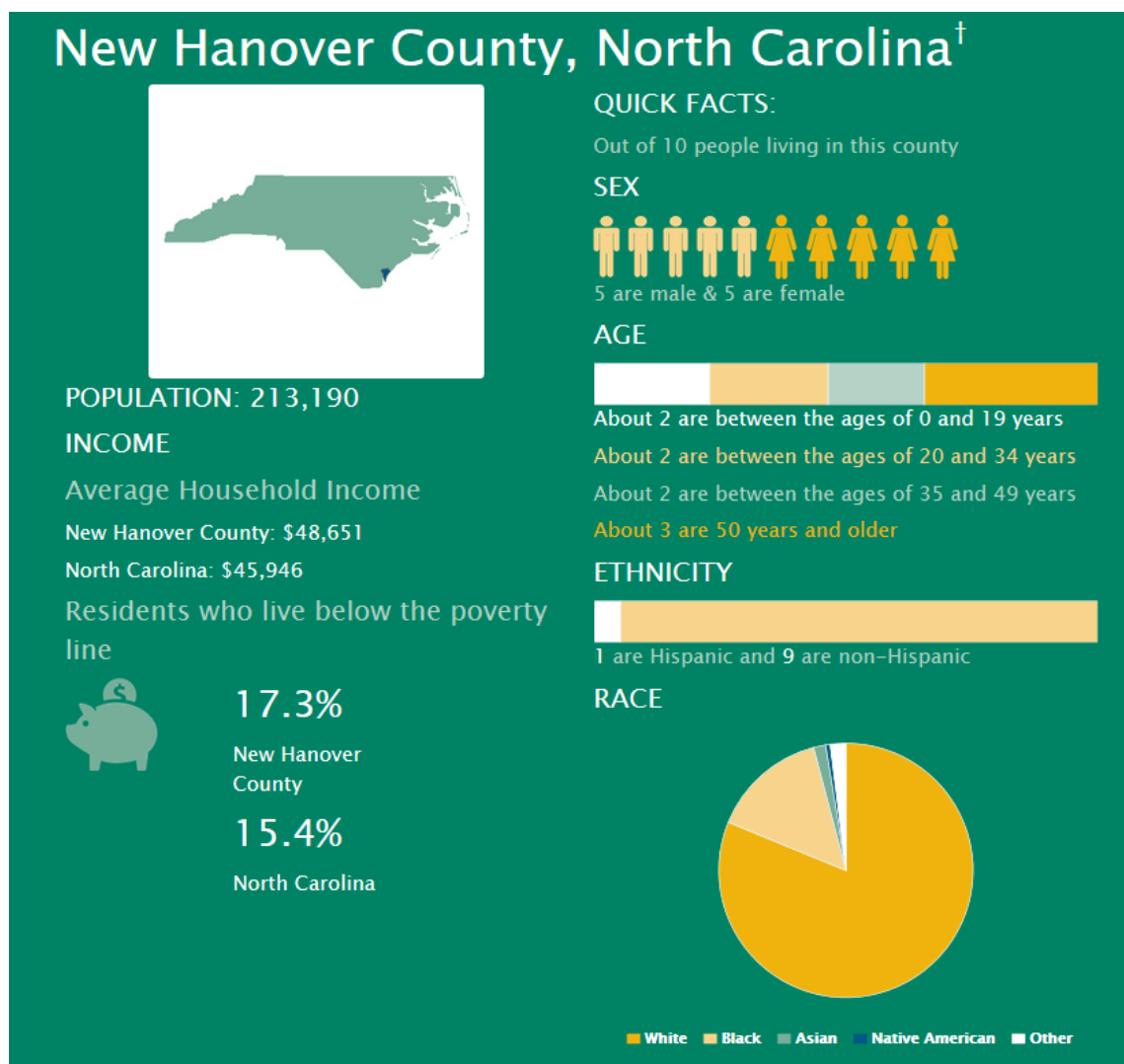


Source: Centers for Disease Control

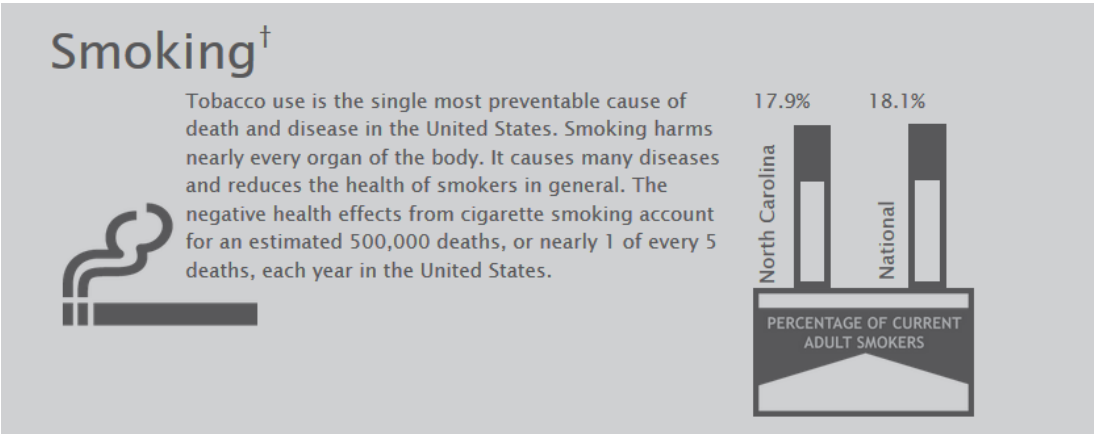


Source: Centers for Disease Control

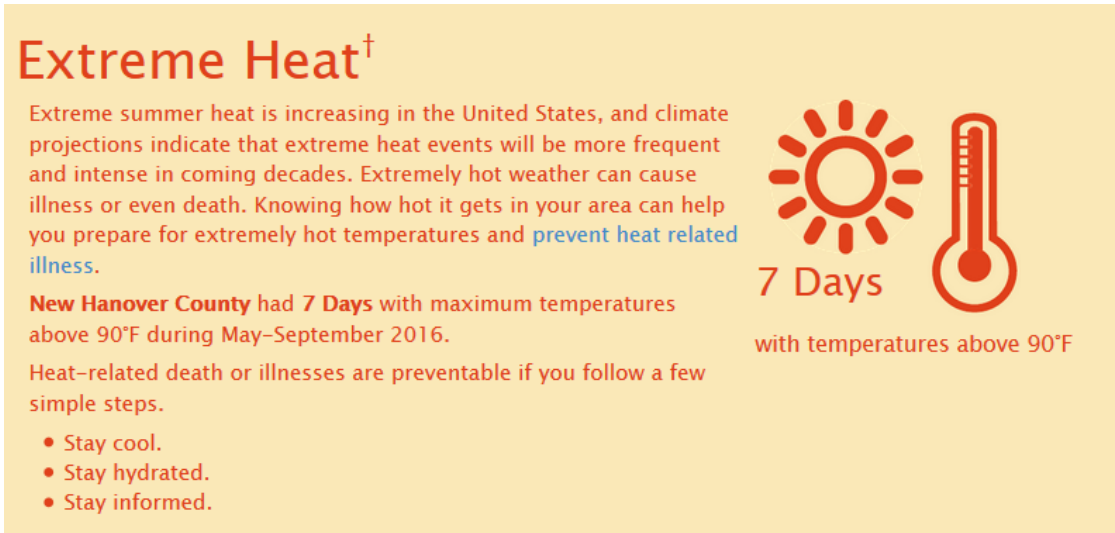
## 4.5 CDC Statistics for New Hanover County



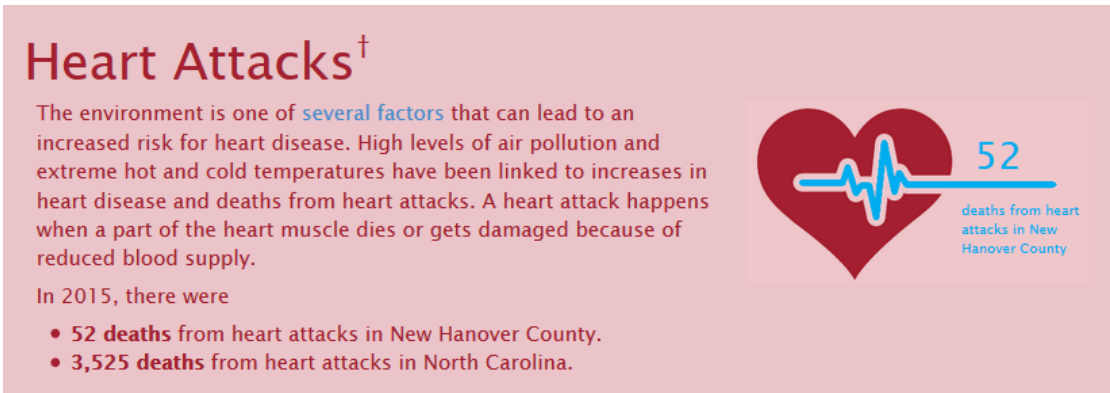
Source: Centers for Disease Control



Source: Centers for Disease Control



Source: Centers for Disease Control



Source: Centers for Disease Control

## 5 National Air Toxics Assessment (NATA)

The National Air Toxics Assessment (NATA) was developed by EPA as a comprehensive evaluation of air toxics across the U.S.<sup>10</sup> NATA provides information about risks of cancer and other serious health effects from breathing air toxics. Assessments are based on chronic exposure from ambient air sources. NATA results provide answers to questions about emissions, ambient air concentrations, exposures and risks across broad geographic areas (such as counties, states and the Nation) at a moment in time. These assessments are based on assumptions and methods that limit the range of questions that can be answered reliably. The results cannot be used to identify exposures and risks for specific individuals, or even to identify exposures and risks in small geographic regions such as a specific census block, i.e., hotspots.

The DAQ may use these data to provide insights into cancer risks for a given area, as shown for Bladen, Brunswick, Columbus, New Hanover and Pender Counties, ranked against the nation; however, a more thorough assessment is conducted where key regulatory and environmental decisions are needed.

### Caveats and Limitations

The broad NATA **summary categories** are **point, nonpoint, onroad, nonroad, fires, biogenics**, and **secondary**. Some of these categories are named the same as the NEI data categories but they are not identical. For example, the NATA nonpoint category is not the same as the NEI nonpoint category because the NEI nonpoint category includes CMVs and locomotives, while the NATA nonpoint category does not.

Further limitations of the assessment include:

- gaps in data
- limitations in computer models used
- default assumptions used routinely in any risk assessment
- limitations in the overall design of the assessment (intended to address some questions but not others).
- variations in detail and completeness of inventories from different geographical regions

### Definitions:

**"N" in 1 million cancer risk** - A risk level of "N"-in-1 million implies a likelihood that up to "N" people, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the specific concentration over 70 years (an assumed lifetime). This would be in addition to those cancer cases that would normally occur in an unexposed population of one million people. Note that this assessment looks at lifetime cancer risks, which should not be confused with or compared to annual cancer risk estimates. If you would like to compare an annual cancer risk estimate with the results in this assessment, you

---

<sup>10</sup> <https://www.epa.gov/national-air-toxics-assessment> accessed December 2017.

would need to multiply that annual estimate by a factor of 70 or alternatively divide the lifetime risk by a factor of 70.

**Secondary formation** - The process by which chemicals are transformed in the air into other chemicals. When a chemical is transformed, the original HAP no longer exists; it is replaced by one or more chemicals. Compared to the original chemical, the newer reaction products can have more, less, or the same toxicity. Transformations and removal processes affect both the fate of the chemical and its atmospheric persistence. Persistence is important because human exposure to chemical is influenced by the length of time the chemical remains in the atmosphere. Certain HAPs (i.e., formaldehyde, acetaldehyde, and acrolein) are formed in the atmosphere through photochemical reactions, and these “secondary” contributions are included in NATA through the photochemical air quality modeling platform.

**Biogenic emissions** – Emissions of formaldehyde, acetaldehyde and methanol from vegetation (plants and trees) as estimated by EPA models.

**Point Sources** – sources that are stationary and fixed and can be located using latitude and longitude data. These sources include large industrial facilities and electric power plants. Airports and railyards are excluded from this category, rather are included in the Nonroad category.

**Nonpoint Sources** – sources which individually are too small in magnitude or too numerous to inventory as individual point sources. Modeling excludes emissions from locomotives, commercial marine vessels, biogenic and agricultural fires.

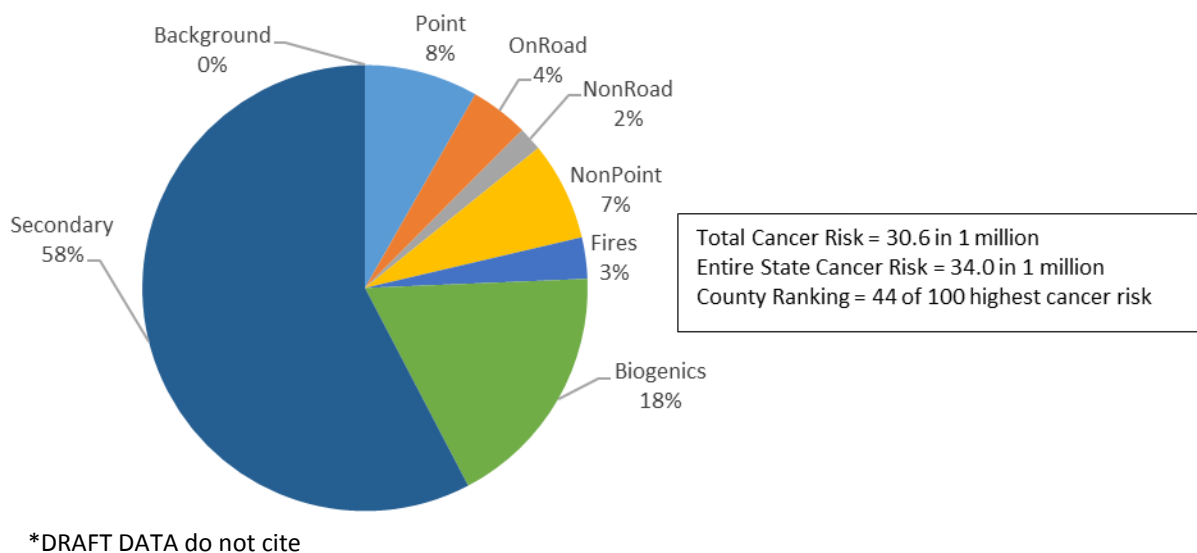
**Onroad sources** – sources include car, truck and bus emissions as estimated by EPA models.

**Nonroad sources** – sources include lawn and garden equipment, and construction and recreational equipment emissions as estimated by EPA models. This category includes commercial marine vessels, locomotives and aircraft engine emissions associated with landing and take-off, and airport ground support vehicles.

**Fires** – sources include wildfire, prescribed burning, and agricultural burning emissions as estimated by EPA models.

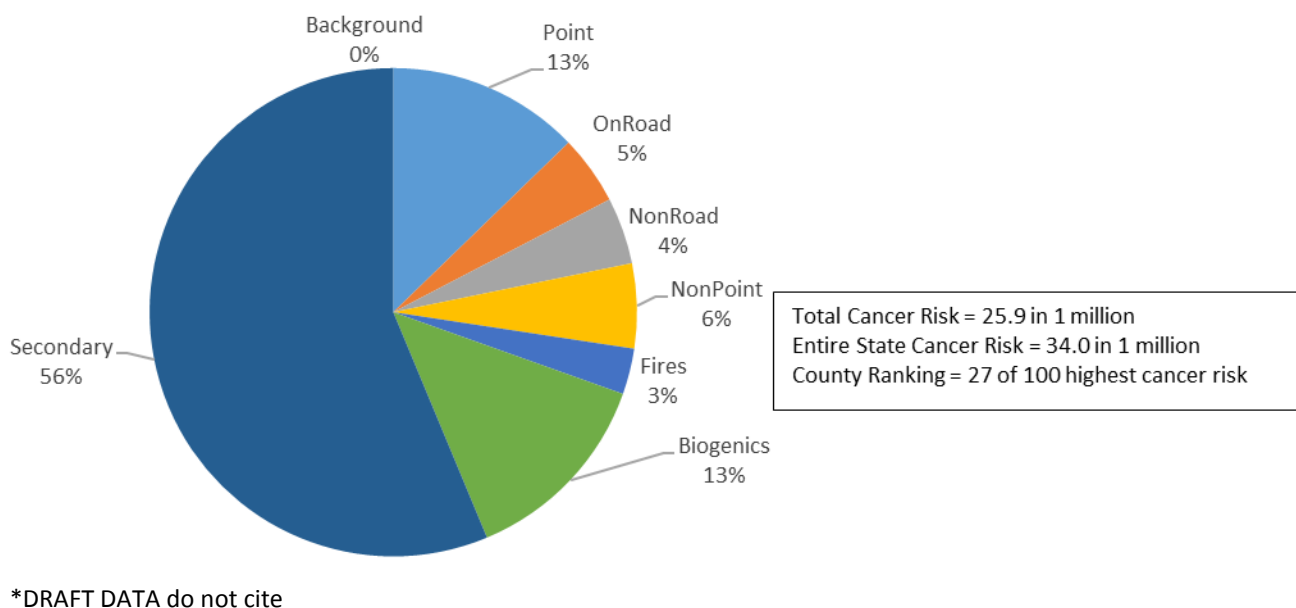
**Background concentrations** - The contributions to outdoor air toxics concentrations resulting from natural sources, persistence in the environment of past years' emissions, and long-range transport from distant sources. The vast majority of risk from the NATA background concentrations is from *carbon tetrachloride*, a ubiquitous pollutant that has few sources of emissions but is persistent due to its long half-life. Background sources, also included in NATA, can include natural sources and anthropogenic air toxics emitted in prior years that persist in the environment, or air toxics emitted from distant sources, including (for those HAPs modeled in HEM-3 but not the Community Multiscale Air Quality [CMAQ]) air toxics transported farther than 50 kilometers.

## 5.1 National Air Toxics Assessment (NATA) for Bladen, Brunswick, Columbus, New Hanover and Pender Counties (Source: EPA Draft)



**Figure 5.1 Bladen County Cancer Risk, 2014NATA\***

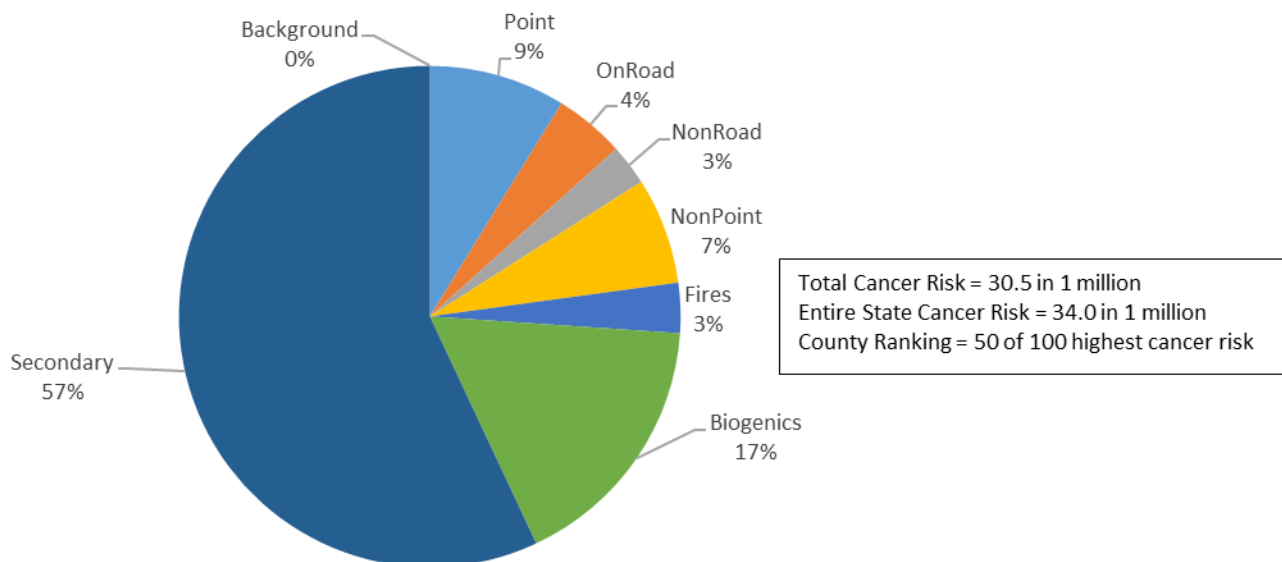
Data Source – 2014v1 National Emissions Inventory, EPA



**Figure 5.2 Brunswick County Cancer Risk, 2014NATA\***

Data Source – 2014v1 National Emissions Inventory, EPA

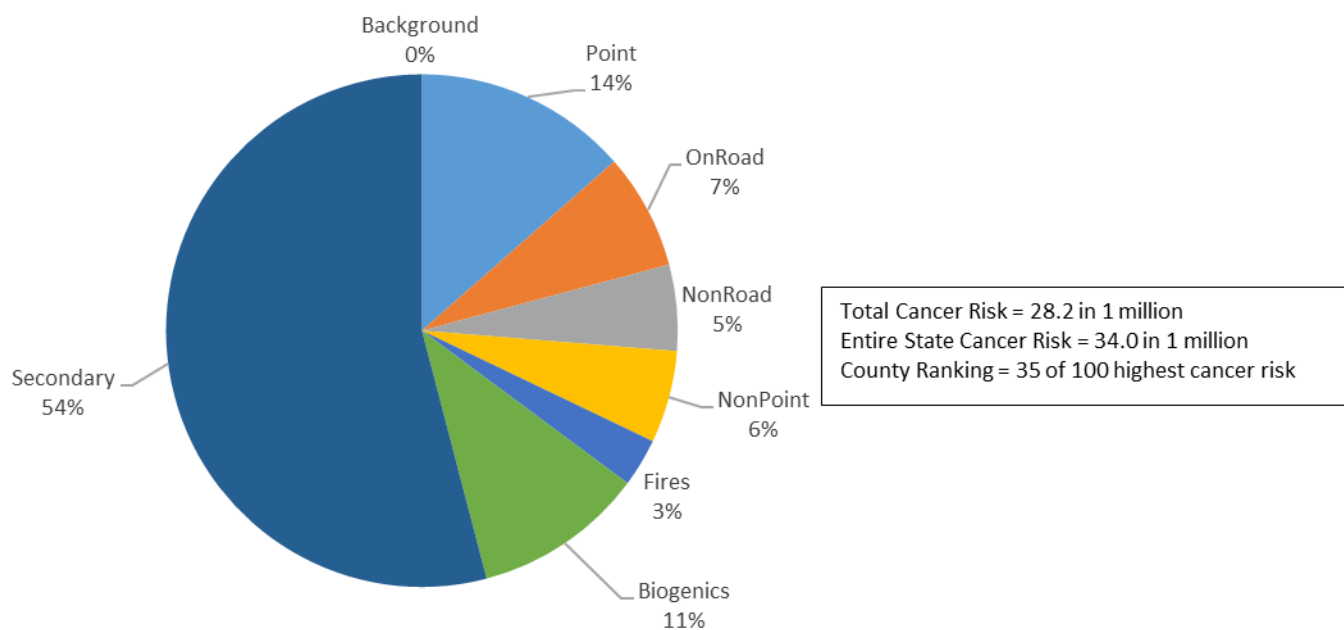




\*DRAFT DATA do not cite

**Figure 5.3 Columbus County Cancer Risk, 2014NATA\***

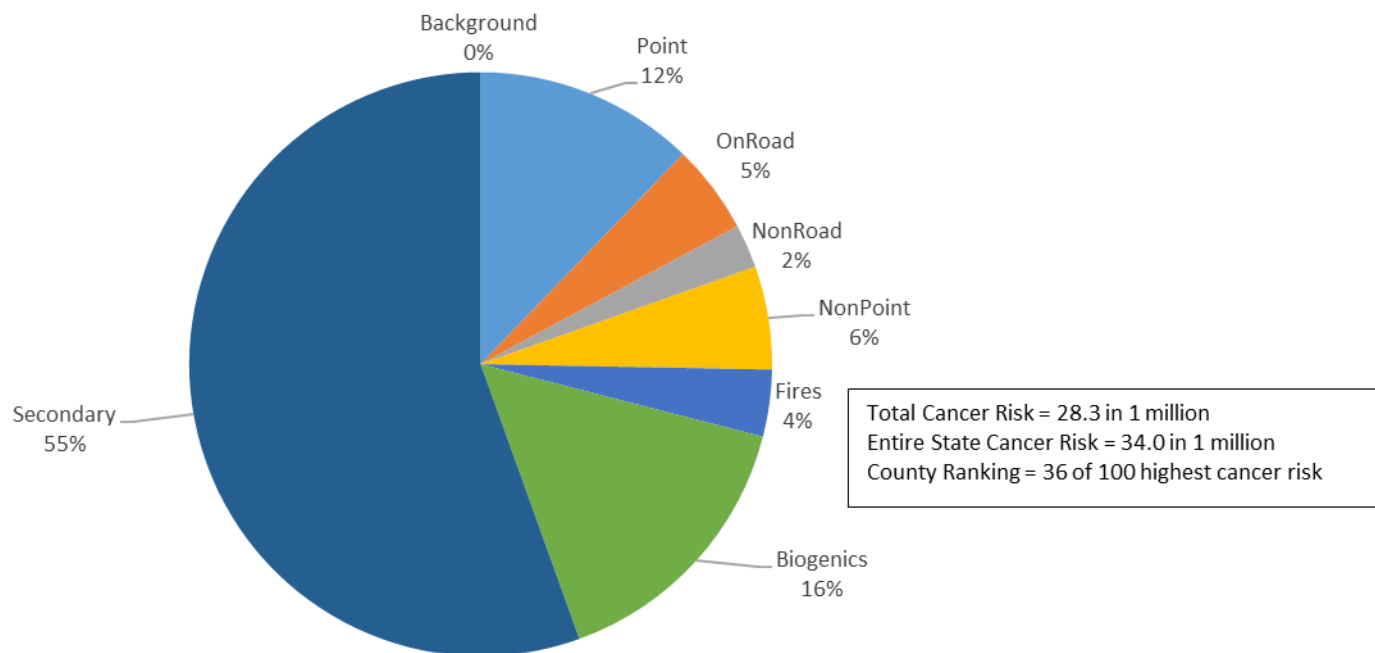
Data Source – 2014v1 National Emissions Inventory, EPA



\*DRAFT DATA do not cite

**Figure 5.4 New Hanover County Cancer Risk, 2014NATA\***

Data Source – 2014v1 National Emissions Inventory, EPA



\*DRAFT DATA do not cite

**Figure 5.5 Pender County Cancer Risk, 2014NATA\***

Data Source – 2014v1 National Emissions Inventory, EPA

**Table 5.1 Air Toxic Pollutants Included in NATA**

Air Toxic (Clean Air Act Name)	NEI Pollutant Code (CAS Number) <sup>a</sup>	Notes
1,1,2,2-Tetrachloroethane	79345	
1,1,2-Trichloroethane	79005	
1,1-Dimethyl hydrazine	57147	
1,2,4-Trichlorobenzene	120821	
1,2-Dibromo-3-chloropropane	96128	
1,2-Diphenylhydrazine	122667	Not in NATA because there were no emissions
1,2-Epoxybutane	106887	
1,2-Propylenimine (2-methyl aziridine)	75558	
1,3-Butadiene	106990	
1,3-Dichloropropene	542756	
1,3-Propane sultone	1120714	
1,4-Dichlorobenzene(p)	106467	
1,4-Dioxane	123911	
2,2,4-Trimethylpentane	540841	
2,4,5-Trichlorophenol	95954	
2,4,6-Trichlorophenol	88062	
2,4-D, salts and esters	94757	
2,4-Dinitrophenol	51285	
2,4-Dinitrotoluene	121142	
2,4-Toluene diamine	95807	

<b>Air Toxic (Clean Air Act Name)</b>	<b>NEI Pollutant Code (CAS Number)<sup>a</sup></b>	<b>Notes</b>
2,4-Toluene diisocyanate	584849	
2- Acetylaminofluorene	53963	
2-Chloroacetophenone	532274	
2-Nitropropane	79469	
3,3'-Dichlorobenzidine	91941	
3,3'-Dimethoxybenzidine	119904	
3,3'-Dimethylbenzidine	119937	
4,4'-Methylene bis(2-chloroaniline)	101144	
4,4'-Methylenedianiline	101779	
4,6-Dinitro-o-cresol, and salts	534521	
4-Aminobiphenyl	92671	
4-Nitrobiphenyl	92933	
4-Nitrophenol	100027	
Acetaldehyde	75070	
Acetamide	60355	
Acetonitrile	75058	
Acetophenone	98862	
Acrolein	107028	
Acrylamide	79061	
Acrylic acid	79107	
Acrylonitrile	107131	
Allyl chloride	107051	
Aniline	62533	
Antimony Compounds	7440360	
Arsenic Compounds (inorganic including arsine)	7440382	
Benzene (including benzene from gasoline)	71432	
Benzidine	92875	
Benzotrichloride	98077	
Benzyl chloride	100447	
Beryllium Compounds	7440417	
Beta-Propiolactone	57578	Not in NATA because there were no emissions
Biphenyl	92524	
Bis(2-ethylhexyl)phthalate (DEHP)	117817	
Bis(chloromethyl)ether	542881	
Bromoform	75252	
Cadmium Compounds	7440439	
Calcium cyanamide	156627	
Captan	133062	
Carbaryl	63252	
Carbon disulfide	75150	
Carbon tetrachloride	56235	
Carbonyl sulfide	463581	
Catechol	120809	
Chloramben	133904	Not in NATA because there were no emissions
Chlordane	57749	
Chlorine	7782505	

<b>Air Toxic (Clean Air Act Name)</b>	<b>NEI Pollutant Code (CAS Number)<sup>a</sup></b>	<b>Notes</b>
Chloroacetic acid	79118	
Chlorobenzene	108907	
Chlorobenzilate	510156	
Chloroform	67663	
Chloromethyl methyl ether	107302	
Chloroprene	126998	
Chromium Compounds	multiple	NATA includes only hexavalent chromium
Cobalt Compounds	7440484	
Coke Oven Emissions	140	
Cresols/Cresylic acid (isomers and mixture)	1319773	Modeled as cresols
Cumene	98828	
Cyanide Compounds	multiple	
Diazomethane	334883	
Dibenzofurans	132649	
Dibutylphthalate	84742	
Dichloroethyl ether (Bis(2-chloroethyl)ether)	111444	
Dichlorvos	62737	
Diethanolamine	111422	
Diethyl sulfate	64675	
Dimethyl aminoazobenzene	60117	
Dimethyl carbamoyl chloride	79447	
Dimethyl formamide	68122	
Dimethyl phthalate	131113	
Dimethyl sulfate	77781	
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	106898	
Ethyl acrylate	140885	
Ethyl benzene	100414	
Ethyl carbamate (Urethane)	51796	
Ethyl chloride (Chloroethane)	75003	
Ethylene dibromide (Dibromoethane)	106934	
Ethylene dichloride (1,2-Dichloroethane)	107062	
Ethylene glycol	107211	
Ethylene imine (Aziridine)	151564	
Ethylene oxide	75218	
Ethylene thiourea	96457	
Ethylidene dichloride (1,1-Dichloroethane)	75343	
Formaldehyde	50000	
Glycol Ethers	N/A	
Heptachlor	76448	
Hexachlorobenzene	118741	
Hexachlorobutadiene	87683	
Hexachlorocyclopentadiene	77474	
Hexachloroethane	67721	

<b>Air Toxic (Clean Air Act Name)</b>	<b>NEI Pollutant Code (CAS Number)<sup>a</sup></b>	<b>Notes</b>
Hexamethylene- 1,6-diisocyanate	822060	
Hexamethylphosphoramide	680319	Not in NATA because there were no emissions
Hexane	110543	
Hydrazine	302012	
Hydrochloric acid	7647010	
Hydrogen fluoride (Hydrofluoric acid)	7664393	
Hydroquinone	123319	
Isophorone	78591	
Lead Compounds	7439921	
Lindane (all isomers)	58899	
Maleic anhydride	108316	
Manganese Compounds	7439965	
m-Cresol m	108394	
Mercury Compounds	7439976	
Methanol	67561	
Methoxychlor	72435	
Methyl bromide (Bromomethane)	74839	
Methyl chloride (Chloromethane)	74873	
Methyl chloroform (1,1,1-Trichloroethane)	71556	
Methyl hydrazine	60344	
Methyl iodide (Iodomethane)	74884	
Methyl isobutyl ketone (Hexone)	108101	
Methyl isocyanate	624839	
Methyl methacrylate	80626	
Methyl tert butyl ether	1634044	
Methylene chloride (Dichloromethane)	75092	
Methylene diphenyl diisocyanate (MDI)	101688	
m-Xylenes	108383	Modeled as xylenes
N,N-Dimethylaniline	121697	
Naphthalene	91203	
Nickel Compounds	7440020	
Nitrobenzene	98953	
N-Nitrosodimethylamine	62759	
N-Nitrosomorpholine	59892	
N-Nitroso-N-Methylurea	684935	Not in NATA because there were no emissions
o-Anisidine	90040	
o-Cresol	95487	Modeled as cresols
o-Toluidine	95534	
o-Xylenes	95476	Modeled as xylenes
Parathion	56382	Not in NATA because there were no emissions
p-Cresol	106445	Modeled as cresols
Pentachloronitrobenzene (Quintobenzene)	82688	
Pentachlorophenol	87865	
Phenol	108952	
Phosgene	75445	

<b>Air Toxic (Clean Air Act Name)</b>	<b>NEI Pollutant Code (CAS Number)<sup>a</sup></b>	<b>Notes</b>
Phosphine	7803512	
Phosphorus	7723140	
Phthalic anhydride	85449	
Polychlorinated biphenyls (Aroclors)	1336363	
Polycyclic Organic Matter	N/A	About 50 specific compounds are in the NEI. They were modeled as 9 discrete PAH groups representing different upper-bound risk estimate “bins” since specific compounds have a wide range of upper-bound risk estimates.
p-Phenylenediamine	106503	
Propionaldehyde	123386	
Propoxur (Baygon)	114261	
Propylene dichloride (1,2-Dichloropropane)	78875	
Propylene oxide	75569	
p-Xylenes	106423	Modeled as xylenes
Quinoline	91225	
Quinone	106514	
Selenium Compounds	7782492	
Styrene	100425	
Styrene oxide	96093	
Tetrachloroethylene (Perchloroethylene)	127184	
Titanium tetrachloride	7550450	
Toluene	108883	
Toxaphene (chlorinated camphene)	8001352	
Trichloroethylene	79016	
Triethylamine	121448	
Trifluralin	1582098	
Vinyl acetate	108054	
Vinyl bromide	593602	
Vinyl chloride	75014	
Vinylidene chloride (1,1-Dichloroethylene)	75354	
Xylenes (isomers and mixture)	1330207	Modeled as xylenes
Diesel PM		Diesel PM is not a HAP and not on the Clean Air Act list but it is modeled in NATA for Nonroad sources

<sup>a</sup> In most cases, the NEI pollutant code is the same as the CAS number. In a few cases (e.g., coke oven emissions) a CAS number has not been assigned, and NEI uses a unique pollutant code.

**Table 5.2 Pollutants Excluded from NATA**

<b>Air Toxic (Clean Air Act Name)</b>	<b>NEI Pollutant Code (CAS Number)<sup>a</sup></b>	<b>Exclusion reason</b>
2,3,7,8-Tetrachlorodibenzo-p- dioxin	1746016	Not included in NATA due to uncertainty in reporting to NEI and exposure route for dioxins is ingestion
Other dioxins/furans	multiple	
Radionuclides		Not included in NATA due to uncertainty in reporting to NEI and emissions not compatible with NATA modeling
Dichlorodiphenyldichloroethylene (DDE)	72559 incorrectly referred to in the Section 112(b) list as 3547-04-4	Compound not reported to NEI
Fine mineral fibers (including rockwool and slag wool and fine mineral fibers)	Fine mineral fibers: 383 Rockwool:617 Slagwool:616	Not in NATA because there were no emissions
Asbestos	1332214	Inhalation exposures not typically expressed in mass units
Diazomethane	334883	Not in NATA because there were no emissions
Hexamethylphosphoramide	680319	Not in NATA because there were no emissions

<sup>a</sup> In most cases, the NEI pollutant code is the same as the CAS number. In a few cases (e.g., coke oven emissions) a CAS number has not been assigned, and NEI uses a unique pollutant code.